# DISTRICT OF COLUMBIA
# DEPARTMENT OF HEALTH

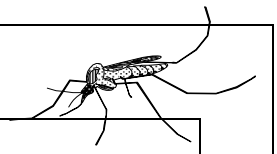
## HEALTH REGULATION AND LICENSING ADMINISTRATION
## BUREAU OF COMMUNITY HYGIENE

### ANIMAL DISEASE PREVENTION DIVISION

# ARBOVIRUS
# SURVEILLANCE AND RESPONSE PLAN

MAY 2009

Government of the District of Columbia
Adrian M. Fenty, Mayor



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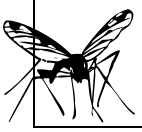
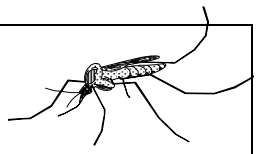




# EXECUTIVE SUMMARY

Under the strong leadership of Mayor Adrian M. Fenty, the West Nile Virus Program has been a great public health success story in the District of Columbia. The Department of Health (DOH) has operated a West Nile Virus (WNV) program since WNV was first reported in the United States in 1999. The three foundations of this program are surveillance, mosquito control and outreach and education. In 2003 and 2005, several cities and states, including the city of Portland, Oregon and the states of Texas, Kentucky and Ohio recognized the District's Arbovirus Response Plan as a model plan and included components from the District Plan into their own plans. The city of Lyndhurst, Ohio cited the District's approach to mosquito management as support for a law banning adulticide applications.

DOH has conducted human, avian, mammal and mosquito surveillance since 1999. DOH maintains an extensive database that tracks the presence and spread of the virus. In calendar year 2002, through avian surveillance it was determined that WNV was endemic in District birds and avian testing was discontinued in August 2002. Even though avian testing was discontinued, DOH continues to track dead bird reports. From 2004 through 2008, in cooperation with the Department of Defense and other federal and regional partners, DOH established and monitored stationary mosquito traps based upon a grid system through out the District that covered neighborhoods, federal enclaves, military installations and parks. This consistent and evenly – spaced method of trap placement provides coverage for all areas of the District and will be utilized in 2009.

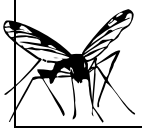
Since the identification of locally-acquired Malaria in nearby Virginia in 2003, DOH enhanced the WNV Response Plan to include monitoring and testing of malaria and other arboviruses. DOH will continue surveillance for malaria, Dengue Fever and other mosquito-borne pathogens when appropriate.

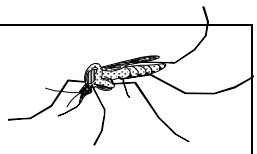
CDC has stated that source reduction and larvicidal applications in catch basins and standing water are essential components to a successful mosquito management program and are the most effective method to reduce mosquito populations and mosquito-borne viruses over time. In 2006 the Department of Health formed a partnership with WASA, The Water and Sewer Authority, to substantially increase the number of larvicidal applications in catch basins and sewage drains. From 2000 to 2008, DOH staff larvicided proactively and in response to positive birds, mosquitoes and humans and community concerns. The larvicide, a biologic product that arrests the mosquito growth in the larval stage, is placed in catch basins and in standing or stagnant water. In 2009, DOH will continue the extensive larvicide program.

DOH'S outreach and education program reached thousands of people through public forums, the distribution of flyers and "hits" on the website. The District's important message remains "prevention and protection". DOH encourages residents to take personal responsibility to prevent conditions for mosquito harborage and to prevent mosquito bites. In 2008, DOH used a number of media channels to get out the message: the DOH website; bulk distribution of informational brochures (in five languages); public presentations; and, door-to-door visits. Staff distributed over 10,000 brochures in bulk. In 2009, DOH will continue these efforts. In addition, DOH plans to create a video public service announcement (PSA) with tips on identification and elimination of potential mosquito breeding sites, prevention of mosquito bites and personal protection.

Recognizing the potential threat to public health created by conditions that support the harborage and breeding of mosquitoes, DOH proposed and the Council approved the "Vector-Borne Infectious Disease Control Act of 2004". DOH staff, under the authority of the Act, issue notices of infraction that impose civil fines and penalties on individuals and businesses that do not abate mosquito harborage conditions that contribute to the risk of mosquito-borne diseases.

In comparison with other states, the incidence of human cases that test positive for West Nile virus in the District has been low. DOH will continue to fight the spread of West Nile Virus and other mosquito-transmitted illnesses by conducting an aggressive surveillance program in 2009.





# Introduction

This plan outlines the activities for implementing a response to West Nile virus or other arbovirus outbreaks and for reducing the risk for disease in the District of Columbia. An arthropod-borne virus (arbovirus) is one that is transmitted to vertebrates by biting insects and acarines (ticks). These viruses multiply in both their vertebrate and invertebrate hosts.

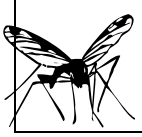
This plan is a working document that identifies various specific protocols for surveillance, mosquito control and public outreach and education. The District of Columbia Arbovirus Surveillance and Response Plan for 2009 is the District's plan for the organized monitoring of arbovirus activity, vector populations, arbovirus infections in vertebrate hosts and humans and other factors to detect or predict changes in the transmission dynamics of these arboviruses. Staff from the District of Columbia's Department of Health, Health Regulation and Licensing Administration, Center of Policy, Planning and Epidemiology, Public Health Laboratory and Emergency Management work collaboratively to develop and implement strategies to decrease the transmission of arboviruses to human and other vertebrate hosts.

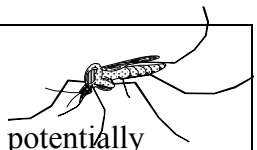
Since West Nile virus (WNv) was first isolated in 1937, it has been known to cause asymptomatic infection and fevers in humans in Africa, West Asia, and the Middle East. Human and animal infections were not documented in the Western Hemisphere until the August 1999 outbreak in the New York City metropolitan area when sixty-two people became sick and seven people died. Since then, the disease has spread across the United States and south to Mexico and the Caribbean. From 1999 through 2008, there have been twenty-eight thousand, nine hundred twenty-nine (28,929) cases of confirmed West Nile virus human illness in the United States reported to CDC, including one thousand, one hundred twenty-seven (1127) deaths.

| | Human Cases | Fatalities |
|---|---|---|
| 1999 | 62 | 7 |
| 2000 | 21 | 2 |
| 2001 | 66 | 9 |
| 2002 | 4156 | 284 |
| 2003 | 9862 | 264 |
| 2004 | 2539 | 100 |
| 2005 | 3000 | 119 |
| 2006 | 4269 | 177 |
| 2007 | 3598 | 121 |
| 2008 | 1356 | 44 |
| TOTAL | 28929 | 1127 |

WNv is transmitted to humans through mosquito bites. Mosquitoes become infected when they feed on infected birds that have high levels of WNv in their blood. Infected mosquitoes can then transmit WNv when they feed on humans or other animals.

WNv is not contagious from person to person and there is no evidence that handling live or dead





infected birds can infect a person. But, to add a further level of safety, if birds or other potentially infected animals must be handled, a protective barrier (e.g., gloves, inverted plastic bags) should be used.

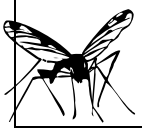
Most WNv infected humans are asymptomatic. A small proportion develops mild symptoms (known as West Nile fever) that include fever, headache, body aches, skin rash and swollen lymph glands. Less than 1% of infected people develop a more severe illness, known as neuro-invasive disease that includes meningitis (inflammation of one of the membranes covering the brain and spinal cord) or encephalitis. The symptoms of these illnesses can include headache, high fever, neck stiffness, stupor, disorientation, coma, tremors, convulsions, muscle weakness, and paralysis. Of the few people that develop encephalitis, a small proportion die but, overall, this is estimated to occur in less than 1 out of 1000 infections.

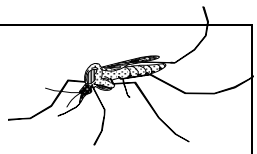
There is no specific treatment for WNv infection or a vaccine to prevent it. Treatment of severe illnesses includes hospitalization and supportive therapy, including the use of intravenous fluids and nutrition, respiratory support, prevention of secondary infections, and good nursing care. Medical care should be sought as soon as possible for persons who have symptoms suggesting severe illness.

Individuals can reduce their contacts with mosquitoes by taking these actions: When outdoors, wear clothing that covers the skin such as long sleeve shirts and pants, apply effective insect repellent to clothing and exposed skin, and limit outside activity during the hours that mosquitoes are feeding which often includes dawn and dusk. In addition, screens should be secured to doors and windows and regularly maintained to keep mosquitoes from entering the home.

**National Surveillance Findings 2008**

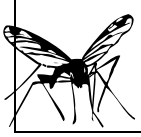
During 2008. 46 states and the District of Columbia (DC) have reported 1,356 cases of human WNV illness to CDC through ArboNET. Of the 1356 cases, 687 (51%) were reported as West Nile meningitis or encephalitis (neuroinvasive disease), 624 (46%) were reported as West Nile fever (milder disease), and 45 (3%) were clinically unspecified at this time. California reported the highest number of cases with a total of 445 human cases (33%) while Arizona followed by 114 (8%). Date of illness onset ranged from January to December; a total of 44 cases were fatal. There were 8 human cases in the District of Columbia.

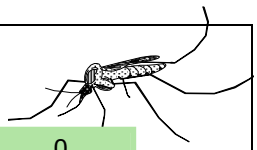




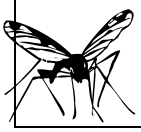
## Final 2008 West Nile Virus Activity in the United States

| State | Encephalitis/ Meningitis | Fever | Other Clinical/Unspecified | Total | Fatalities |
|---|---|---|---|---|---|
| Alabama | 11 | 7 | 0 | 18 | 0 |
| Arizona | 62 | 43 | 9 | 114 | 7 |
| Arkansas | 7 | 2 | 0 | 9 | 0 |
| California | 292 | 149 | 4 | 445 | 15 |
| Colorado | 17 | 54 | 0 | 71 | 1 |
| Connecticut | 5 | 2 | 1 | 8 | 0 |
| Delaware | 0 | 0 | 1 | 1 | 0 |
| District of Columbia | 4 | 1 | 3 | 8 | 0 |
| Florida | 3 | 0 | 0 | 3 | 0 |
| Georgia | 4 | 3 | 1 | 8 | 0 |
| Idaho | 2 | 31 | 6 | 39 | 1 |
| Illinois | 12 | 4 | 4 | 20 | 1 |
| Indiana | 3 | 0 | 1 | 4 | 0 |
| Iowa | 3 | 0 | 3 | 6 | 1 |
| Kansas | 14 | 17 | 0 | 31 | 0 |
| Kentucky | 3 | 0 | 0 | 3 | 0 |
| Louisiana | 18 | 31 | 0 | 49 | 1 |
| Maryland | 6 | 7 | 1 | 14 | 0 |
| Massachusetts | 1 | 0 | 0 | 1 | 0 |
| Michigan | 11 | 4 | 2 | 17 | 0 |
| Minnesota | 2 | 8 | 0 | 10 | 0 |
| Mississippi | 22 | 43 | 0 | 65 | 2 |
| Missouri | 12 | 3 | 0 | 15 | 1 |
| Montana | 0 | 3 | 2 | 5 | 0 |
| Nebraska | 7 | 40 | 0 | 47 | 1 |
| Nevada | 9 | 5 | 2 | 16 | 0 |
| New Jersey | 6 | 4 | 0 | 10 | 2 |
| New Mexico | 5 | 3 | 0 | 8 | 0 |
| New York | 32 | 14 | 0 | 46 | 6 |
| North Carolina | 2 | 0 | 1 | 3 | 0 |
| North Dakota | 2 | 35 | 0 | 37 | 0 |
| Ohio | 14 | 1 | 0 | 15 | 1 |



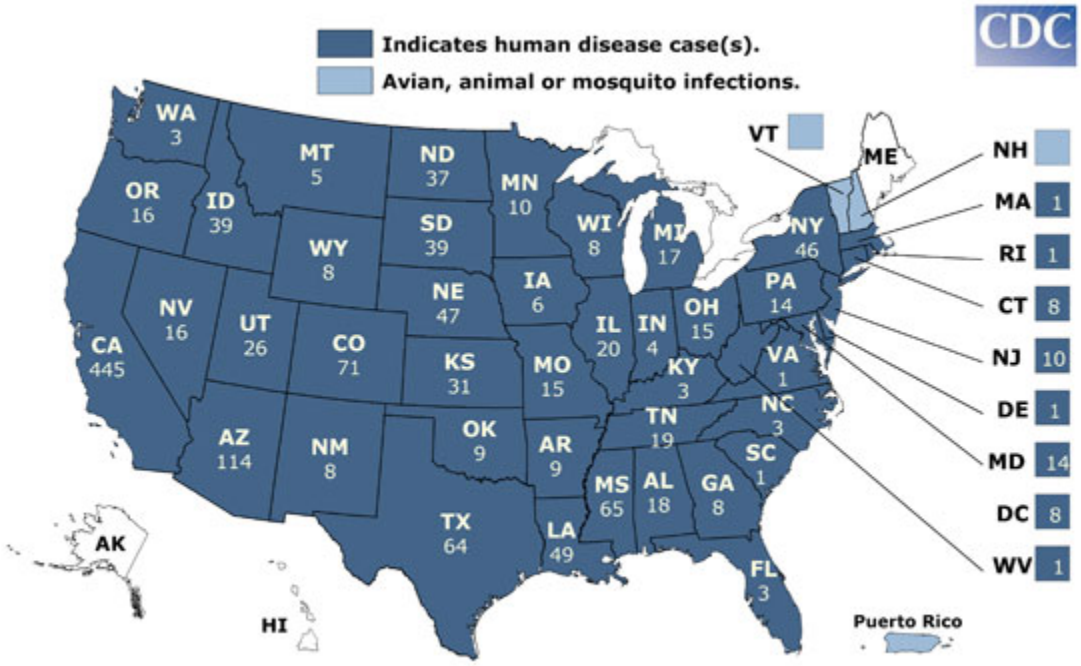


| | | | | | |
|---|---|---|---|---|---|
| Oklahoma | 4 | 5 | 0 | 9 | 0 |
| Oregon | 3 | 13 | 0 | 16 | 0 |
| Pennsylvania | 12 | 2 | 0 | 14 | 1 |
| Rhode Island | 1 | 0 | 0 | 1 | 0 |
| South Carolina | 0 | 1 | 0 | 1 | 0 |
| South Dakota | 11 | 28 | 0 | 39 | 0 |
| Tennessee | 12 | 7 | 0 | 19 | 1 |
| Texas | 40 | 24 | 0 | 64 | 1 |
| Utah | 6 | 18 | 2 | 26 | 0 |
| Virginia | 0 | 0 | 1 | 1 | 0 |
| Washington | 2 | 1 | 0 | 3 | 0 |
| West Virginia | 1 | 0 | 0 | 1 | 0 |
| Wisconsin | 4 | 3 | 1 | 8 | 1 |
| Wyoming | 0 | 8 | 0 | 8 | 0 |
| **Totals** | **687** | **624** | **45** | **1356** | **44** |



## Final 2008 West Nile Virus Activity in the United States

This map reflects surveillance findings occurring between January 1, 2008 through December 31, 2008 as reported to CDC's ArboNET system for public distribution by state and local health departments.



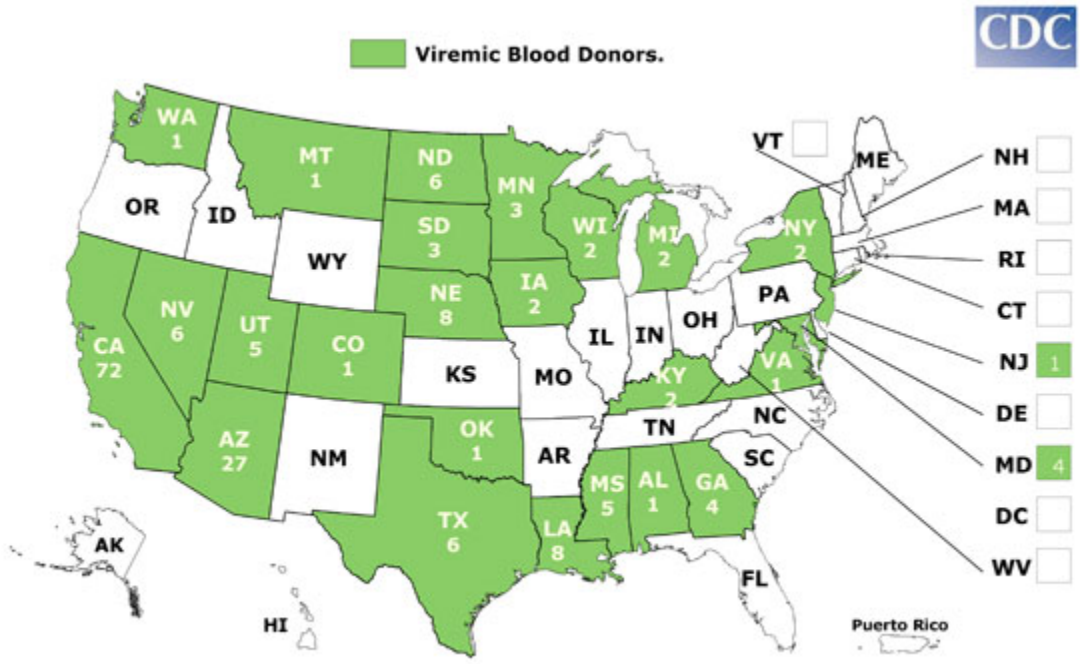

Map shows the distribution of avian, animal, or mosquito infection occurring during 2008 with number of human cases if any, by state. If West Nile virus infection is reported to CDC from any area of a state, that entire state is shaded.

**Data table:**

Avian, animal or mosquito WNV infections have been reported to CDC ArboNET from the following states in 2008: Alabama, Arizona, Arkansas, California, Colorado, Connecticut, Delaware, District of Columbia, Florida, Georgia, Idaho, Illinois, Indiana, Iowa, Kentucky, Louisiana, Maryland, Massachusetts, Michigan, Minnesota, Mississippi, Missouri, Montana, Nebraska, Nevada, New Hampshire, New Jersey, New Mexico, New York, North Dakota, Ohio, Oklahoma, Oregon, Pennsylvania, Puerto Rico, Rhode Island, South Carolina, South Dakota, Tennessee, Texas, Utah, Vermont, Virginia, Washington, West Virginia, Wisconsin, and Wyoming.

Human cases have been reported in Alabama, Arizona, Arkansas, California, Colorado, Connecticut, Delaware, District of Columbia, Florida, Georgia, Idaho, Illinois, Indiana, Iowa, Kansas, Kentucky, Louisiana, Maryland, Massachusetts, Michigan, Minnesota, Mississippi, Missouri, Montana, Nebraska, Nevada, New Jersey, New Mexico, New York, North Carolina, North Dakota, Ohio, Oklahoma, Oregon, Pennsylvania, Rhode Island, South Carolina, South Dakota, Tennessee, Texas, Utah, Virginia, Washington, West Virginia, Wisconsin, and Wyoming.

## Final 2008 West Nile Virus Viremic Blood Donor Activity in the United States




A total of 174 presumptively viremic blood donors (PVDs) have been reported to CDC's ArboNET surveillance program through state and local health departments for 2008. A PVD is a person whose blood tested positive when screened for the presence of West Nile virus. PVDs are followed up by the blood agency to verify their infection with additional tests. Some PVDs do go on to develop symptoms.

**Data table:**
Indicates Presumptively Viremic Blood Donors (PVDs) reported to CDC ArboNET for public distribution for 2008 from the following states: Alabama, Arizona, California, Colorado, Georgia, Iowa, Kentucky, Louisiana, Maryland, Michigan, Minnesota, Mississippi, Montana, Nebraska, Nevada, New Jersey, New York, North Dakota, Oklahoma, South Dakota, Texas, Utah, Virginia, Washington, and Wisconsin.

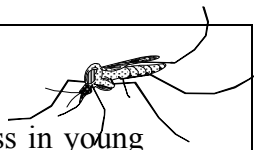
### Mosquito pools

A total of 8,770 WNV positive mosquito pools have been reported in 40 states and DC.

### Routes of Transmission:

West Nile virus (WNv), a mosquito-borne flavivirus introduced recently to North America, is a human, equine, and avian neuropathogen. The majority of human infections with WNV are mosquito-borne; however, laboratory-acquired infections with WNv and other arboviruses also occur. There were two cases of WNV infection in laboratory workers, without other known risk factors, who acquired infection through percutaneous inoculation. Laboratory workers handling fluids or tissues known or suspected to be WNV-infected should minimize their risk for exposure.

In 2002, newly recognized mechanisms of person-to-person WNv transmission were described by health officials including transmission from mother to infant through breast milk. WNV genetic material was transiently present in the breast milk of women with WNV infection and measurable



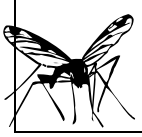
WNv-specific IgM was detected in babies. Despite this finding, the risk of WNv illness in young children is low.

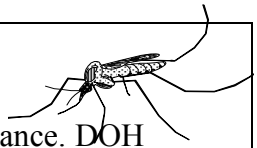
WNV can also be transmitted via organ transplant and blood transfusion. In September 2006, the South Dakota Department of Health (SDDH) was notified of WNND in a man aged 82 years with end-stage renal disease who had received a kidney transplant on 25 Aug 2006. Because the patient had been hospitalized during the 2 weeks before onset of his WNV-related illness, WNV transmission by organ transplantation or blood transfusion was considered more likely than transmission by mosquito bite. Nationwide blood screening for WNV has been successful in preventing transfusion-transmitted WNV. However, as with all blood donations screening, infections can be transmitted to transfusion recipients on rare occasions despite negative donor test results. Although WNV transmission by blood transfusion is rare, the cases described in this report underscore the importance of clinical recognition, effective WNV blood screening strategies, and investigation coordination.

However, the risks of contracting WNV by these routes are very small as compared with other risks associated with these treatments. There is also evidence of intrauterine West Nile virus infection. WNV had not been previously associated with intrauterine infection or adverse birth outcomes. There are reports of transplacental WNV transmission. Pregnant women should take precautions to reduce their risk for WNV or other arboviral infection and should undergo diagnostic testing when clinically appropriate.

**District of Columbia Perspective:**

Evidence of West Nile virus first appeared in the District in 2000 as detected through avian surveillance. Thirteen birds were tested for West Nile virus in 1999. All tested negative. In 2000, five birds tested positive for West Nile virus with the first collection date of September 26. There was no other positive West Nile activity in the District. In 2001, nine hundred fourteen (914) birds were collected and four hundred forty-four (444) birds were processed for testing. Three hundred sixty birds (360) tested positive, with a rate of positivity of 81.08%. Eighty-four (84) birds tested negative. Eight hundred forty-one (841) mosquito pools and four thousand three hundred sixty-eight (4,368) individual female mosquitoes were submitted for testing. Three pools of Culex mosquitoes tested positive. In 2001, Twenty (20) human specimens were submitted for testing. All tested negative. There was no human or mammal positive West Nile activity in the District.
In 2002, the District continued to conduct human, avian, mosquito and mammal surveillance. Nine hundred five (905) birds were collected and three hundred forty (340) birds were processed for testing. One hundred thirty- four (134) birds were disposed of, one hundred seventy-five (175) birds tested positive and thirty-one birds (31) tested negative with a rate of positivity of 84.95%. Avian collection and testing was discontinued in August of 2002 when West Nile virus was considered endemic to the region. DOH collected and tested mosquitoes in cooperation with the US Army, The National Zoo and the National Park Service. One thousand three hundred fifteen (1315) mosquito pools and ten thousand seven hundred fifty-five (10,355) individual female mosquitoes were collected and submitted for testing. Eighty-four (84) mosquito pools tested positive for West Nile virus. This is a case positivity rate of 6.39%. Eighty (80) human specimens were submitted for testing, thirty-one (31) patients tested positive, with two WNV-related fatalities. No mammals were submitted for testing.





In 2003, the District continued to conduct human, avian, mosquito and mammal surveillance. DOH did not collect and test dead birds, but did collect dead bird reports. DOH collected and tested mosquitoes in cooperation with the US Army, The National Zoological Park and the National Park Service. Two thousand one hundred forty-four (2,114) mosquito pools and twenty thousand sixty-two (20,062) individual female mosquitoes were collected and submitted for testing. Forty-nine (49) mosquito pools tested positive for West Nile virus in the District of Columbia. This is a case positivity rate of 2.31%. Forty-eight (48) human specimens were submitted for testing, three (3) tested positive for WNV with a 100% recovery rate for all patients. No mammals were submitted for testing.

In 2004, the District continued to conduct human, avian, mosquito and mammal surveillance. DOH collected dead bird reports. DOH collected and tested mosquitoes in cooperation with the US Army, The National Zoological Park and the National Park Service. One thousand six hundred seventy-one (1,671) mosquito pools and twenty-eight thousand nine hundred twenty-nine (28,929) individual female mosquitoes were submitted and tested. Of these, 42 pools tested positive. This is a case positivity rate of 2.51%. Seventeen (17) human specimens were submitted for testing, fifteen (15) tested negative and two (2) tested positive for WNV (one specimen positive for West Nile virus neuro-invasive disease and one positive for West Nile fever). There was a 100% recovery rate for all patients. No mammals were submitted for testing.

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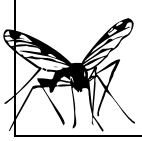
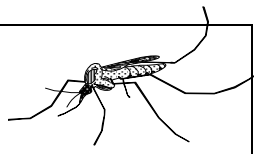
In 2007, fourteen additional traps were set in all Wards of the District. One thousand fourteen (1,014) mosquito pools and ten thousand, one hundred twelve (10,112) individual female mosquitoes were submitted and tested. Of these, 12 pools tested positive.

In 2008, specimens were tested at the District of Columbia Public Health Laboratory. The Department of Defense continued to collect specimens from Walter Reed Army Medical Center, Ft. McNair Army Base, Armed Forces Retirement Home, Marine Barracks, Naval Observatory, Anacostia Annex of the Air Force, and the Washington Naval Yard. The Department of Health also set mosquito traps at the D.C. National Zoo. All specimens collected from the Department of Defense were transported to the U.S. Army Center for Health Promotion and Prevention (USACHPPM) for arboviral testing. All specimens collected by DOH were tested at the District of Columbia Public Health Laboratory. The total of 11 human cases were submitted for testing which resulted in 8 confirmed human illnesses infected with West Nile Virus. Mosquito surveillance revealed a total of 62 positive mosquito pools from 1,292 pools tested.

No mammals were submitted for testing. Dead bird collection discontinued in July of 2002 when WNV was determined to be endemic in the District.





**DISTRICT OF COLUMBIAWEST NILE VIRUS SURVEILLANCE 2002-2008**

**HUMAN SURVEILLANCE**

| | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 |
|---|---|---|---|---|---|---|---|
| **Tested** | 80 | 43 | 17 | 8 | 11 | 0 | 11 |
| **Positive** | 31 | 3 | 2 | 4 | 2 | 0 | 8 |
| **Probable** | 3 | 6 | 0 | 1 | 0 | 0 | 1 |
| **Negative** | 28 | 25 | 15 | 3 | 4 | 0 | 3 |
| **Incomplete** | 18 | 9 | 0 | 0 | 1 | 0 | 0 |

**MOSQUITO SURVEILLANCE**

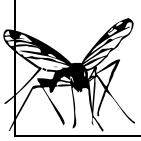
| | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 |
|---|---|---|---|---|---|---|---|
| **Pools Tested** | 1,315 | 2,114 | 1,671 | 1,399 | 1,917 | 1,014 | 1,292 |
| **Pools Positive** | 84 | 49 | 42 | 55 | 56 | 12 | 62 |
| **#Females tested** | 10,755 | 20,684 | 28,929 | 27,087 | 31,726 | 10,112 | 12,025 |

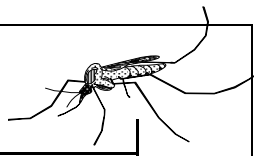
**AVIAN SURVEILLANCE ***

| | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007, 2008 |
|---|---|---|---|---|---|---|---|
| **Collected** | 914 | 905 | NA | NA | NA | NA | NA |
| **Tested** | 444 | 206 | NA | NA | NA | NA | NA |
| **Positive** | 360 | 175 | NA | NA | NA | NA | NA |
| **Negative** | 84 | 31 | NA | NA | NA | NA | NA |
| **Rate of Positivity** | 81.08% | 84.95% | NA | NA | NA | NA | NA |

## 2008 West Nile Virus Mosquito Surveillance

| Ward | 2008 Site Number | Street Address | Positive Pools |
|---|---|---|---|
| Ward 1 | 1C | 1800 block Newton Street NW | |
| | 1E | 3100 block Connecticut Ave NW (North) | 1 |
| | 1F | 3100 block Connecticut Ave NW (South) | |
| | 1G | 300 block McMillan Drive NW | 1 |
| Ward 2 | 2F | 3600 block S Street NW | |
| | 2G | 2100 block O St NW | |
| | 2H | 1300 block Massachusetts Ave NW | |
| Ward 3 | 3E | 4400 block Harrison Ave NW | 4 |
| | 3G | 3800 block Wisconsin Ave NW | 2 |
| | 3H | 70 unit block Observatory Circle NW | |
| | 3I | 4400 block Greenwich Parkway NW | |
| Ward 4 | 4D | 1700 block Shepherd St NW | |
| | 4E | 500 block Oglethorpe St NW | 3 |
| | 4F | 700 block Tuckerman St NW | |
| | 4H | 1500 block Emerson St NW | 1 |

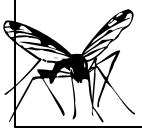


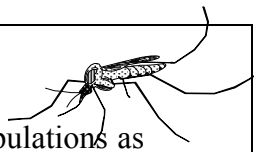


| | | | |
|---|---|---|---|
| | 4I | 4500 block Blagden Ave NW | |
| Ward 5 | 5C | 1200 block New York Ave NE | |
| | 5F | 1200 block Kearney St NE | 1 |
| | 5G | 3000 block Douglas St NE | |
| | 5H | 4200 block 13th St NE | |
| | 5I | 4200 Harewood Rd NW | |
| Ward 6 | 6A | 638 Massachusetts Ave NE | |
| | 6E | 600 block I St SW | 1 |
| | 6F | 1900 block M St SE | 2 |
| Ward 7 | 7A | 2400 block 34th St SE | 1 |
| | 7C | 4300 block Polk St NE | 3 |
| | 7D | 5700 block Blaine St NE | 3 |
| | 7E | 5700 block Nannie Helen Burroughs Ave NE | |
| | 7G | 2900 block Pennsylvania Ave SE | |
| Ward 8 | 8A | 10 unit block Atlantic St SE | |
| | 8B | 500 block Lebaum St SE | |
| | 8D | 700 block Mississippi Ave SE | 2 |
| | 8H | 2400 block 25th St SE | |
| DoD Installations | DOD1 | Fort McNair | 7 |
| | DOD2 | Armed Forces Retirement Home | 15 |
| | DOD3 | Anacostia Annex | 2 |
| | DOD4 | Marine Barracks | 2 |
| | DOD5 | Naval Research Laboratory | |
| | DOD6 | Naval Observatory | 4 |
| | DOD7 | Washington Naval Yard | 1 |
| | DOD8 | Walter Reed Army Medical Center | 6 |
| Total Positive Pools | | | 62 |

Data indicates that the District's WNV program is a great public health success. In response to WNV-positive mosquito pools, the Department of Health staff larvicides the area and distributes information door to door to District residents in neighborhoods. The health information material has been translated into Spanish, Korean, Vietnamese, and Chinese and emphasizes prevention and protection. Staff also speak at neighborhood meetings and work with residents to evaluate their property to eliminate potential mosquito breeding sites. The number of mosquitoes collected is significantly reduced in the areas that are larvacided extensively.

The District of Columbia Arbovirus Surveillance and Response Plan of 2009, comports with the Centers for Disease Control and Prevention's (CDC) guidelines that are available to assist public health professionals with West Nile virus surveillance and control efforts. Both documents emphasize surveillance methods to assess risk and protection and prevention strategies. In addition, the District is a member of the Metropolitan Washington Council of Governments (COG) Regional Emerging Pathogens West Nile virus Planning Committee. The focus of the District's arbovirus surveillance program is the detection, reporting, and management of WNV and other arboviruses to prevent human epidemics and animal epizootics. The laboratory will test for additional arboviruses when performing tests on humans, equines, mosquitoes, and birds, as requested.



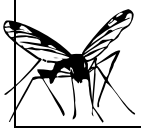


The 2009 plan focuses on the surveillance of human, mosquito, avian, and mammal populations as indicators of the presence of the WNV. As the primary vector, the mosquito is the key concern in the development of this response plan. DOH staff utilizes the identification of mosquito species, their location, population numbers and presence of infection to assess the current risk to the community and the necessary response steps based upon that perceived risk. Moreover, whenever a positive tissue culture is confirmed positive through PCR, the specimens will be tested for St. Louis encephalitis (SLE), Eastern Equine encephalitis (EEE), Lacrosse encephalitis and Dengue Fever.

Generally, WNV does not cause symptoms in people who have been exposed. However, in some individuals, WNV can cause a very mild infection (West Nile Fever) including fever, muscle aches, rash, swollen lymph nodes, and a "sick" feeling. This illness starts about 3-15 days after the mosquito bite, lasts a few days, and then subsides. A very small percentage (<1%) of people infected with WNV or other arboviruses can experience neuro-invasive disease which affects a person's nervous system. Specific types of neuro-invasive disease include: WN encephalitis, WN meningitis and WN meningoencephalitis.

Encephalitis is an inflammation of the brain, meningitis is an inflammation of the membrane that surrounds the brain and the spinal cord and meningoencephalitis is an inflammation of both the brain and the membrane surrounding it. Encephalitis and meningitis due to arboviruses can cause death. Data from 1999 through 2008 indicate that deaths from WNV infection occur primarily in persons greater than 55 years of age.

As part of the West Nile virus surveillance system, the Department of Health (DOH) conducts human, avian, mammal and mosquito surveillance and compiles thorough database and spreadsheet records detailing this surveillance. DOH established a West Nile virus Call Center number at 202-535-2323, and extensive web site information at www.doh.dc.gov. The following pages describe the District's 2008 plan to respond to West Nile and other arboviruses through surveillance, control, analysis, and education activities.



# Human Surveillance

**Purpose:**

DOH will continue to conduct active human surveillance in cooperation with area hospitals and the local medical communities. Increased monitoring for neuro-invasive disease is a necessary tool for public risk assessment.

The most severe type of disease due to a person being infected with West Nile virus is called neuro-invasive disease because it affects a person's nervous system. Specific types of neuro-invasive disease include: West Nile encephalitis, West Nile meningitis or West Nile meningoencephalitis. Encephalitis refers to an inflammation of the brain, meningitis is an inflammation of the membrane surrounding the brain and the spinal cord, and meningoencephalitis refers to inflammation of the brain and the membrane surrounding it. West Nile fever is another type of illness that can occur in people who become infected with the virus. It is characterized by fever, headache, tiredness, aches and sometimes rash. Although the elderly and immunocompromised are at higher risk, healthy people have been sick for days to several weeks.

In 2000, there were no reported cases of human WNV infection in the District.

In 2001, the first cases of WNV in neighboring Maryland were identified through enhanced surveillance (3 WN encephalitis cases, 3 WN aseptic meningitis cases). Two of these six patients died. This illustrates the importance of a strong surveillance program. There were no reported cases of human WNV infection in the District in 2000 or in 2001.

In 2002, there were eighty (80) human specimens tested for WNV. Thirty-one (31) samples tested positive, twenty- eight (28) samples tested negative. Three (3) samples were "probable" and eighteen (18) samples are considered "pending" because there is some information that is unavailable.

In 2003, there were forty-three (43) human specimens tested for WNV. Twenty-five (25) tested negative, three (3) tested positive, six (6) are "probable" and nine (9) remain "pending".

In 2004, seventeen (17) West Nile suspect human specimens were tested, whereby fifteen (15) were negative, one (1) patient had WNV fever, one (1) was a confirmed WNV case diagnosed as meningoencephalitis.

In 2005, eight (8) West Nile suspect human specimens were tested, whereby three (3) were negative, two (2) patients had WNV fever and two had WNV meningitis.

In 2006, eleven (11) West Nile suspect human specimens were tested, whereby nine (9) were negative, and two (2) had WNV fever.

In 2007, four West Nile suspect human specimens were tested and none were found to be positive for West Nile virus.

In 2008, there were eight (8) confirmed human cases with WNV out of eleven (11) human cases tested. Among the 8 human cases, 2 were females and 6 were males, all above 50 years of age. Of the 8 (eight) cases, 4 (four) were reported as West Nile meningitis or encephalitis (neuroinvasive disease), 1 (one) was reported as West Nile fever (milder disease), and 3 were clinically unspecified. The onset of illness for 3 cases was in August and 5 during September 2008.

**Strategy:**

DOH staff shall investigate all reported cases of WNV disease in the District during the WNV surveillance period to ensure detection of WNV or other arboviral disease or bioagent. These investigations may include blood tests or other tests to detect WNV in the brain or the spinal fluid. DOH staff shall inform public health officials and District agencies about this disease in an effort to decrease the transmission of the virus, through the findings of the human surveillance.

**Actions:**

1. DOH Center for Policy, Planning, and Epidemiology Division of Disease Surveillance and Investigation staff shall inform physicians and other health professionals about WNV disease through a Physician's Alert- See Appendix A. The Physician's Alert contains reporting criteria and specimen submission protocol and shall be forwarded to physicians and hospitals. The Alert reminds doctors and hospital infection control personnel (ICPs) that encephalitis and meningitis can be indicators of arboviral infection. Any case of encephalitis or meningitis must be reported to DOH no later than 24 hours.

2. DOH Center for Policy, Planning, and Epidemiology Division of Disease Surveillance and Investigation staff shall send a fact sheet containing the case definition from CDC to all physicians. The letters are sent at the beginning of the West Nile virus transmission year and again approximately two months later as a reminder. The national case definition for arboviral encephalitis should be used to classify cases as confirmed or probable, once appropriate laboratory results are available. In CDC publications of national arbovirus surveillance data, no distinction is made between confirmed and probable human cases for the purposes of case counting.

3. All DOH pertinent parties from the Animal Disease Prevention Division, Public Health Laboratory (PHL), and the Center for Policy, Planning, and Epidemiology shall contact each other by phone as needed to confirm that all parties have exchanged all necessary information. In addition, a staff person from the West Nile virus program in the Animal Disease Prevention Division will prepare and circulate a spreadsheet daily to keep all parties informed of all cases.

4. A West Nile virus staff person will contact all District hospitals on a weekly basis to determine if any new cases fall within the case definition.

5. A Center for Policy, Planning, and Epidemiology, Division of Disease Surveillance and Investigation staff person shall contact physicians in appropriate specialties (i.e. infectious

6. DOH Center for Policy, Planning, and Epidemiology, Division of Disease Surveillance and Investigation staff person shall, as a special surveillance project, utilize syndromic surveillance of emergency department logs for conditions including, but not limited to fever with rash or lymphadenopathy.

7. CDC has notified all blood collection agencies of the protocol for testing their blood supply. If the test is positive, the blood is removed from the blood supply. DOH shall send a letter informing blood collection agencies (hospitals, Red Cross) to report presumptive viremic donations (PVDs).

8. DOH Center for Policy, Planning, and Epidemiology Division of Disease Surveillance and Investigation staff shall blast fax the Physician's Alert to over 900 hospital ICPs, family practitioners and pediatricians. In addition, the staff shall place the Alert on the web site and forward it to the Medical Society of DC (MSDC) and the Medical Honor Society, MEDCHI, and DCHA.

9. CDC has notified all commercial lab directors to indicate specimen testing requirements and protocol. For samples sent directly to a commercial lab, the commercial lab must then send a sample to the PHL for testing. Commercial labs must notify the PHL immediately of any positive result. The Director of the Public Health Lab will establish protocols for accepting samples from commercial labs for testing at the PHL.

10. DOH shall prepare a WNV Human Specimen Laboratory Testing Algorithm for distribution and placement on the web site.

11. The DOH Public Health Laboratory shall conduct all human specimen testing, per DOH protocol, and inform all pertinent parties by email and phone of positives results.

12. DOH Center for Policy, Planning, and Epidemiology, Division of Disease Surveillance and Investigation staff person shall produce a weekly, monthly, annual report on the human WNV surveillance data.

13. DOH shall provide professional education to hospitals and interested medical and nursing groups where necessary.

14. DOH shall consider the following actions in the event of a positive human case and/or death:

a. Notify email distribution list, per HIPAA regulations.
b. Notify the Director of DOH and the Director of Communication to determine whether to issue a press release emphasizing protection and prevention..
c. Contact Mayor's office.
d. Call CDC to report the case verbally and discuss recommendations.
e. Inform COG Health Officers and other pertinent and regional partners.

f. Conduct a conference call with CDC or COG Health Officers.
g. Discuss the case with hospital staff and caretakers.
h. Evaluate the situation and educate caretakers and other residents of the home regarding prevention and protection.
i. Evaluate the necessity to conduct a serological survey in the area.
j. Send a DOH team to the neighborhood to identify and reduce potential mosquito breeding sites.
k. Distribute outreach and education information in an eight square block area surrounding the location of the positive human case.
l. Larvicide in the eight square block area of the address of the victim
m. Schedule additional community speaking engagements as necessary.
n. Complete the appropriate DOH reporting forms.

15. Information on reportable cases of neuro-invasive disease will be shared between the West Nile virus program, the Public Health Laboratory and the Center for Policy, Planning, and Epidemiology.

16. Results of human testing for WNV and other arboviruses (EEE, SLE, WEE & LAC) will be collected and analyzed by DOH on a weekly basis, and the results forwarded to CDC.

# Mosquito Surveillance

**Purpose:**

Mosquitoes are the vectors for the transmission of certain diseases to humans and animals. Therefore, it is important to monitor various mosquito species throughout the District, especially those species known to transmit arboviruses. It is equally important to analyze the mosquitoes to determine if they are carrying West Nile virus, Malaria, Dengue fever or any other arbovirus.

The risk of disease transmission correlates directly to the presence of mosquito carriers that test positive for arboviruses and their population densities. Mosquito surveillance enables staff to conduct risk assessment, systematic planning, and a structured response. Activities involve trapping, speciation, determining population densities, and arboviral testing of resident mosquitoes.

Identifying mosquito-breeding sites for elimination or treatment, particularly those located near susceptible human populations, is a continuous and critical activity to support a formulation of an effective mosquito management program. Based on the results, DOH staff can assess the potential risk for disease in local animal or human populations and initiate mosquito control measures.

**Strategy:**

Multiple mosquito genera have been identified in the District as carriers of West Nile virus and malaria. The Department of Health has made a commitment to identify and test mosquitoes for diseases that may threaten the public health and safety of the residents and visitors in the District. Culex pipiens is the predominant carrier of the West Nile virus in the Washington, D.C. area.

The mosquito species collected within the District are: Culex, Aedes, Ochlerotatus, Anopheles, Coquillettidia, and Psorophora. DOH staff shall set over 32 mosquito traps beginning the first week of June and continuing through October. Traps will be set for 2 trap nights per week. The mosquitoes shall be collected, sorted, prepared for testing and transported to the DC Public Health Laboratory for arboviral testing.

The focus of mosquito surveillance is to trap and test mosquitoes to determine infection rates. The CDC gravid trap, designed specifically to trap this species, will be the main tool for this surveillance. Previous experience has shown that the gravid traps work extremely well in the District.

In addition to WNV testing, all collected Anopheles will be tested for malaria. Other collected mosquitoes may be tested for Yellow Fever, Dengue fever and other arboviruses.

DOH and its federal and local partners have established stationary mosquito trap locations based on a grid system to cover the city with an even distribution of traps. In addition, staff will determine locations of other mosquito traps that will be moved in response to events, such as, increased mosquito activity or increased numbers of specimens testing positive. DOH shall work

cooperatively with the US Army and National Zoological Park to set traps and collect mosquitoes from trap locations that are owned by the federal partners to ensure complete coverage per the grid configuration.

**Actions:**

1. During the active mosquito season (typically April through October), the District of Columbia Department of Health will use special equipment to trap mosquitoes throughout the District.

2. Through a partnership between the DC Department of Health and the Department of Defense, trap locations will be determined in a grid system throughout the District, with an approximate maximum of 1.5 miles between any two traps.

3. The DOH staff shall set approximately 32 traps twice per week with two trap nights per trap per setting.

4. Staff from the Department of Defense mosquito-testing lab shall assist in training DOH staff in mosquito identification, collection, specimen preparation, and transportation.

5. DOH staff shall establish stationary trap locations following a grid and several mobile traps, with location dependent upon various factors, such as, positive test results from other surveillance systems.

6. Frequency of trap setting may change based on mosquito density or minimum infection rates.

7. Mosquitoes shall be transported to the DC Public Health Lab for arboviral testing. Prior to shipping DOH staff shall identify the mosquitoes, while the Public Health Laboratory will analyze the mosquitoes for the presence of West Nile and other mosquito-borne diseases.
8. The DOH staff shall enter test results into a special database, called Arbo-NET© and upload the information to CDC. Information collected on mosquito population numbers and distribution will be collected during field studies and will be analyzed simultaneously with the mosquito virus test results. These results will help to identify possible areas of risk for WNV transmission by mosquitoes in the District.

9. DOH staff shall procure sampling equipment for larval investigations. Equipment includes; dip sticks, felt sampling strips, and containers. Investigations will be on an as needed basis to determine which species are utilizing breeding sites.

10. When a positive mosquito pool is identified, DOH will consider the following actions:
    a. Forward the information to the DOH Director of Communications to determine whether a press release will be issued.
    b. Distribute outreach and education information in an eight square block area surrounding the location of each positive mosquito pool.
    c. Larvicide in the eight square block area as the address of the positive pool
    d. Work with residents to identify and eliminate potential mosquito breeding sites.
    e. Upload information to CDC.

# Avian Surveillance

**Purpose:**

The District of Columbia collected and tested dead birds from 2000-2002 as an early indicator of the presence of West Nile virus. Based on high levels of positive birds, 85%, DOH considers WNV to be endemic in the bird population in the District. Dead bird collection is no longer used as a primary tool to monitor disease and disease risk in the District of Columbia.

Several states, including the state of Maryland, have discontinued an active dead bird collection and testing program. Information on the proper disposal of the birds is available at the DOH website at www.dchealth.dc.gov and by the Call Center staff at (202)535-2323.

**Strategy:**

The Department of Health, in consultation with CDC, now considers West Nile virus endemic and enzootic in the District of Columbia. The value of collecting and testing dead birds as a predictor of virus activity is significantly diminished and may be considered unnecessary. Resources will be spent through outreach and education to educate and inform the public about prevention and protection measures. The District may test certain avian species, such as raptors or birds from endangered populations or exotic bird collections.

Call center staff shall record and compile dead bird reports. The public is asked to report the location and physical description of all dead birds.

**Actions:**

1. The Department of Health shall monitor CDC updates regarding avian surveillance.

2. Various sites throughout MD and DC will be selected for mist netting in an attempt to detect the species of birds that may be reservoirs of WNV, as resources permit. Wild avian species will be humanely captured in accordance with USFWS guideline in areas with an ongoing or previous history of WNV activity; serum (and/ or swab, tissue) samples will be obtained. The bird will be aged, sexed, banded, recorded and released. Where possible, serology results will be matched with swab or tissue sample results. Data on banded birds will be submitted to the National Bird Banding Laboratory at the Patuxent Wildlife Research Center, Laurel, MD. U.S. FWS permits have been obtained for this purpose. These activities are dependent upon adequate funding.

3. The Department of Health shall assist the National Zoo in monitoring the wild bird collection and collect dead bird reports.

# Equine and Other Mammal Surveillance

**Purpose:**

DOH shall conduct passive mammal surveillance in cooperation with area veterinarians, wildlife rehabilitators, local animal shelters and barn staff at the public equine boarding facility. Increased monitoring for encephalitic disease is a necessary tool for public risk assessment. West Nile virus can infect other mammals and is particularly virulent in horses and causes a nearly 40% mortality rate. Mammals are considered dead-end hosts, although some experiments under extreme scientific conditions have produced some level of transmission from animal to animal in cats. There is not sufficient scientific evidence to deem other mammals a suitable indicator at this time.

It is important to alert veterinarians about this disease, provide equine testing information if WNV or other arboviral infections are suspected, and encourage equine vaccination against WNV. DOH recommends vaccination of all equines residing or working in the District.

No mammals have tested positive in the District for the last eight years.

**Strategy:**

It is essential to monitor equine and other mammal West Nile virus activity. Veterinarians are encouraged and instructed to inform DOH of any possible West Nile virus infection, particularly those animals that present with a neurological component. DOH shall investigate and take measures as necessary. DOH will recommend WNV vaccine to owners of horses and police department in District.

**Actions:**

1. DOH shall notify veterinarians about the WNV surveillance plan for horses and other mammals and give specimen submission recommendations for vaccines. The notification letter sent to veterinarians provides information about the clinical signs of WNV, how to obtain testing for horses, information on the WNV equine vaccine and reporting protocol for equines and other mammals.

2. If a horse is suspected of having WNV infection, veterinarians will be asked to collect appropriate specimens (i.e. CSF, blood, necropsy samples) for testing or analysis. The DC Public Health Laboratory will perform virus isolation and polymerase chain reaction (PCR) on brain tissue and IgM capture ELISA on serum samples. Cerebrospinal fluid (CSF) has not been a useful diagnostic specimen to detect WNV in horses; therefore, its submission for arboviral testing will be discouraged. Confirmatory testing of sera will occur at NVSL in Ames, Iowa pending approval of the USDA/APHIS Area Veterinarian in Charge (AVIC).
3. Necropsies (thorough examinations of the bodies of dead horses to detect cause of death) will be performed, for a fee, on horses at any of the five Maryland Animal Health Diagnostic Laboratories, if the cause of death suggests WNV or other arboviral diseases causing encephalitis. Equine testing may take several weeks to complete.

4. DOH shall set small mammal traps at the location of mist nets to detect the virus activity in various wild mammals, as resources permit. Serum (and /or swab, tissue) samples will be collected from wild mammals and submitted for WNV detection. These activities are dependent upon adequate funding.

5. Once an equine or other mammal has been WNV-confirmed, DOH will consider the following actions:

a. Inform COG Health Officers, District veterinarians and other partners.
b. Test other mammals such as squirrels on a random basis.
c. Submit data results to the Director of Communications to determine if a press release is in order.
d. Contact animal owner and stable manager to discuss situation and educate them about prevention and protection.
e. Evaluate necessity for serological survey to be conducted at the location of the positive equine or other mammal.
f. Distribute outreach and education information in an eight square block area surrounding the location of the positive equine or other mammal.
g. Larvicide in 8 square block area as address of mammal testing positive for WNV.
h. Schedule additional community speaking engagements as necessary.
i. Complete DOH reporting forms.
j. Upload data to CDC.

6. Results of horse blood testing and of horse necropsies will be collected, analyzed, and reported to CDC on a weekly basis.

   **Note:** Protection of horses involves vaccination and keeping horses stabled inside during high mosquito feeding times, i.e., dusk and dawn. Insect-proofing stables and use of repellents are strongly recommended. USDA approved an equine WNV vaccine in 2002 that has proved to be effective and safe.

# Mosquito Management

**Purpose:**

The safest and most successful technique in controlling mosquito populations is to identify and eliminate potential mosquito breeding sites and mosquito harborage by removing standing pools of water (e.g. waste tires, yard clutter, and neglected swimming pools). Introduction of natural predators, such as goldfish, or larvicidal applications to pools of water can also be effective in reducing larval hatching in those sites. To minimize the public health risk of WNV, other arboviruses and other diseases, it is important to reduce the sources of standing water and supplement by controlling the larvae growth (larvicide) as a mosquito management tool to reduce the mosquito population.

CDC has stated that larvicidal applications in catch basins and standing water as an essential component to a mosquito management program and it is the most successful method to reduce mosquitoes over time. In addition, the CDC recommends larvicidal applications rather than spraying for both efficacy in reducing mosquito populations, environmental factors and cost effectiveness. Best practices also indicate that preparation and enforcement of nuisance legislation contributes to mosquito elimination. DOH staff shall apply larvicide to catch basins and standing water. Adulticiding only kills mosquitoes that are flying and remains effective for only a few hours. The efficacy of adulticiding is open for debate and is not considered an effective tool for mosquito management or control through only one application, or, over time, as shown through scientific research. Reapplications of adulticide may compound negative health effects of pesticide usage.

In addition, DOH in cooperation with the Maryland Department of Agriculture, Natural Resources Division, will consider stocking stormwater ponds and other aquatic habitats with mosquito larval eating fish (Gamubsia holbrooki), if the habitat is satisfactory for survival of the fish.

In 2008, staff from DOH's vector control and the staff from Washington's Water and Sewer Authority, conducted treatments at seventeen thousand five hundred and fifty three (17,553) catch basins in response to targeted mosquito populations and citizen complaints. In 2006, the DC Department of Health's West Nile program formed a partnership with the Washington's Water and Sewer Authority, to increase the number of catch basins and standing water sites that were treated. The treatment also included alleys with poor drainage, ponds, swamps, and park sites.

DOH responded to WNV positive human test results, positive mosquito results, increased mosquito density and nuisance areas by applying larvicide in an eight square block area from the specific address or location.

**Strategy:**

DOH, following CDC recommendations, shall apply larvicidal treatment to mosquito breeding

sites beginning early and lasting late into the season. Staff applies larvicidal treatments, as outlined in other sections of this document, in response to both positive mosquito pool collections and positive human reports. Larviciding appears to be a relatively inexpensive and effective method for mosquito control and reduction, while significantly aiding in the protecting the residents of the District against West Nile virus.

The District does not expect to spray for adult mosquito control for many reasons.

- Washington, DC has the highest asthma rate in the country (2.5 times the national average). Aerosolized pesticides can trigger asthma and aggravate respiratory conditions. To lessen the negative effects of spraying, it would be necessary to have every person remain indoors for several hours after spraying. Broadcast aerosol applications of pesticides, even at night, will elicit a negative public response.
- Forty percent (40%) of the land in Washington, DC is federally owned. Embassies are located on foreign soil. The District does not have authority to apply larvicide or adulticide products at embassies. Multiple jurisdictions within the confines of the District create difficulty in developing and implementing policy. Pesticides from aerial or ground ULV applications can drift and potentially cause liability issues.
- Washington, DC is home to an endangered species (Hays Spring Amphipod) and a rare invertebrate (Kenk's Amphipod). As aquatic arthropods, these shrimp-like organisms are extremely sensitive to pesticide residues. These species are found nowhere else in the world. Hays Spring Amphipod is known only from a spring on the grounds of the National Zoo and the Kenks Amphipod is presently only known from a site in Rock Creek Park.
- The Asian Tiger Mosquito (Aedes albopictus), a West Nile Virus vector, is a day flying mosquito. Application of pesticide sprays during the evening would have limited effect on this species.
- Non-target organisms would be affected. Broad-spectrum insecticides such as Malathion and Sumithrin will kill many insects that are unintended targets.

**Actions:**

1. DOH staff shall begin larvicidal applications as weather conditions become conducive to mosquito breeding activity.

2. Larvicidal application sites are initially determined based on a grid-system throughout each ward in the District.

3. DOH staff shall apply larvicide in an eight square block zone surrounding the location of positive mosquito pools from surveillance year 2008. DOH staff shall larvicide each grid location approximately 3 times per year.

4. As positive WNV sites become known through surveillance measures, DOH staff shall apply larvicide in eight square block zones surrounding each positive location and repeated every four to six weeks.

5. DOH staff shall enforce local ordinances prohibiting the breeding and harborage of disease-causing insects.

6. DOH shall aggressively enforce the regulations of the Vector-Borne Infectious Disease Control Act, including civil infractions, abatement notices, and fines.

7. DOH staff shall notify the D.C. Water and Sewer Authority (DCWASA) of the need for DCWASA to monitor, assess, clean and maintain the catch basins located throughout the District.

8. DOH may consider a partnership with the Maryland Department of Natural Resource, to stock ponds, stormwell drains, and floodplains, with mosquito larvae eating fish, (Gambusia holbrooki).

# Public Information, Outreach & Education

**Purpose:**

The DOH shall inform District residents and visitors citizens of the risk from arboviruses and inform them of current DOH surveillance, prevention and management strategies. Public cooperation is essential in reducing the risk of WNV infection by identifying and eliminating mosquito-breeding sites and taking personal protective measures. For successful implementation, DOH shall provide information to the public, healthcare communities, and government agencies. Flyers, web sites, news briefs, bulletins, and physician alerts exist for distribution to targeted populations. Press releases will be issued as required.

The DOH shall release educational campaigns seasonally based upon the mosquito life cycle and current threats to citizen health. Information will be developed accentuating targeted messages for specific time periods. There will be early year, mid year and late year messages.

In 2008, brochures were distributed to elderly homes, day care providers, and neighborhood services, door-to-door and to all DC Libraries. Literature was also provided at various events. In addition, DOH representatives participated in numerous media forums such Heath Fairs, Green DC, Earth Day, public schools, association meetings, and community meetings.

**Strategy:**

The development of multiple targeted messages distributed throughout the surveillance year was a strategy that was used successfully in New York in 2002. Outreach and education information was considered an essential component in protecting the public health and safety of the District residents and visitors.

**Actions:**

1. The Mayor shall conduct a press conference to announce the publication and implementation of this Plan following approval.

2. DOH shall establish the West Nile Virus Call Center on or about April 1 or earlier as indicated by environmental and meteorological conditions.

3. DOH shall update the public with informational materials concerning West Nile virus infections and ways to minimize mosquito exposure. These documents will be made available by request through the Call Center and on the DOH website.

4. DOH will create a video public service announcement (PSA) on the topics of personal protection, use of repellants, identification and elimination of environmental conditions that may be conducive for the breeding and growth of mosquitoes. These activities are dependent upon adequate funding.

5. DOH in partnership with the Department of Public Works (DPW) and other agencies will conduct a Tire Round-Up in late spring, as resources permit. This program will decrease the number of old tires in the community provide habitat for the breeding and growth of mosquitoes by providing a location where residents may bring old tires for recycling – See Appendix [F].

6. Representatives from DOH shall be available to answer questions from the public and media. DOH Office of Communication will handle the coordination of media requests.

7. The public education campaign shall emphasize the following– See Appendix [G]:

a) Personal protection and prevention methods (use of repellents, wearing clothing on extremities, staying indoors at dusk and dawn).
b) The elevated risk to immuno-compromised and elderly citizens of developing serious symptoms from WNV infection.
c) How to eliminate sites around residential areas, commercial establishments, and recreational areas where mosquitoes can breed and develop.
d) Where and whom to call for further information about mosquito control.
e) Landscaping tips to discourage mosquitoes from breeding on properties.
f) Identification and elimination of environmental conditions in cemeteries (i.e. standing water in decorative urns) and open spaces that may be conducive to the breeding and growth of mosquitoes.

8. DOH shall distribute information to healthcare providers, residential facilities, churches, recreation centers, Office of Maternal and Child Health (OMCH), Addiction Prevention and Recovery Administration, public schools and other government agencies.

9. If mosquitoes in a given area are determined to have WNV, a public education campaign will focus directly on that area.

10. Other field personnel in DOH, such as food safety inspectors, shall distribute brochures and other information.

11. All pertinent information, such as weekly reports, mapping and brochures will be provided to the Mayor and will be available on the web. The web site will be updated every two weeks or less.

# Public Health Laboratory

**Purpose:**

The District of Columbia Public Health Laboratory (PHL) expanded capabilities to conduct comprehensive West Nile Virus arboviral testing in 2008 and will continue to test specimens in 2009.

All arboviral suspect specimens will be tested in the PHL. The laboratory will run real-time polymerase chain reaction (PCR) and confirmatory plaque-reduction neutralization testing (PRNT) on both human and animal specimens as indicated. The PHL will conduct screening and confirmatory testing on all in-patient submissions from District hospitals and on specimens initially determined positive by commercial labs.

Mosquito screening for arboviruses will also be conducted at the PHL using CDC approved protocols.

**Strategy:**

The District of Columbia has expanded laboratory capacity to permit both human and mosquito arboviral testing to be completed in house in order to protect the public health and safety of the residents and visitors in the District. Increased analytical monitoring for encephalitic disease is a necessary tool for public health risk assessment.

**Actions:**

1. Infrastructure for West Nile Virus testing has been developed at the PHL. The necessary equipment and CDC recommended protocols for human specimen testing are ready for use. Human specimens will be tested by PCR for WNV, SLE, and other arboviruses as appropriate.

2. Staff training for West Nile Virus testing is complete.

3. A West Nile Virus validation study has been completed.

4. Proficiency Testing has been initiated.

5. The PHL will adhere to all HIPPA regulations. Patient information will be kept strictly confidential and test results will be forwarded to appropriate parties by secure means only.

# Information Technology

**Purpose:**

Monitoring infectious and communicable disease cases within and around the District of Columbia Metropolitan Area is based on compulsory reporting requirements for emergency and infection control departments, clinical laboratories, physicians, and both District and Federal legislative mandates. The Department of Health is now developing the Washington Automated Disease Surveillance System (WADSS), a new automated surveillance system based on the CDC's National Electronic Disease Surveillance System (NEDSS). The purpose of this system is to take advantage of contemporary technology to make reporting between health providers, state/local public health agencies, and CDC both more rapid and timely, and consistent.

Currently, the West Nile Virus Database is an Access Database and data received by phone or fax is entered into the database by a program staff. With the introduction of Geographic Information Systems (GIS) into the science field, tracking the spread of disease has become easier. Benefits of a GIS-based system include targeted remediation and effectiveness in planning and controlling costs of remediation efforts and the ability to readily map "hot spots".

**Actions:**

1. DOH staff shall continue to include West Nile Virus staff in the NEDSS and Bioterrorism Surveillance Committee.

2. DOH staff shall improve coordination and integration of data collection through the Washington DC automated Disease Surveillance System.

3. DOH staff shall secure transmission of data via a web-based system.

4. DOH staff shall accept, route and process electronic HL7 messages containing laboratory, clinical, information and integrate with mosquito and avian databases.

5. DOH staff shall develop data reporting and visualization capability.

6. DOH staff shall implement a security system and appropriate security policies.

7. DOH staff shall assist in the complete installation of GIS equipment and programs.

# Data Analysis and Reporting

**Purpose:**

The decision making process is largely based on application of statistical data analysis. Information from the West Nile Virus Surveillance System can be used to compile and produce graphical displays showing the pattern and spread of the virus. Other analyses can be done to detect clusters of infections and to determine the geographic origin of the outbreak.
The surveillance system will provide basic information on the spatial distribution of WNV. The combination of this data with information about weather conditions, over space and time, will provide the foundation for developing spatial analytical and forecasting models. It is imperative that data are compiled accurately and forwarded to various partners in a timely manner. DOH shall contract with an entity to provide the following services: (These activities are dependent upon adequate funding.)
**Actions:**

1. Improve coordination and integration of data collection the Washington DC automated Disease Surveillance System.

2. Compile ground meteorological and remotely sensed data for the District of Columbia for an assessment of seasonal climatic and environmental change.

3. Provide simple descriptive analyses of data and show trends on a weekly basis.

4. Disseminate information by the following media: routine surveillance reports, such as MMWR of CDC, monographs, and state annual reports, peer review journal publications, DOH website and presentation at conferences and other national meetings.

# Acknowledgements & Contact Information

The Department of Health would like to acknowledge the following distinguished organizations and individuals for their strong support, contribution and participation in the development of this Plan:

Centers for Disease Control and Prevention
The Metropolitan Washington Council of Governments
The National Park Service
The National Zoological Park
The United States Army Center for Health Promotion and Preventive Medicine
The United States Department of Agriculture/ Wildlife Services

**The Department of Health's West Nile Virus/Arbovirus Surveillance Program Working Group:**
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Lakisha Thompson, WNV Public Health Investigator

**Other Distinguished Contributors:**
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Feseha Woldu, PhD. Senior Deputy Director, Health Regulation and Licensing Administration

**CONTACT INFORMATION**

For further information, visit the Department of Health website at www.doh.dc.gov and click on the West Nile Virus button, or contact:

Maria Hille
West Nile Virus Program Manager
825 North Capital St, NE, 8th Floor
Washington, DC 20002
Phone: (202) 535-1952
Email: maria.hille@dc.gov

For Customer Service Requests
Call the West Nile Virus Call Center at (202) 535-2323 or
The Mayor's Call Center at 311

# APPENDIX A
# PHYSICIAN ALERT: WEST NILE VIRUS
# GOVERNMENT OF THE DISTRICT OF COLUMBIA
# DEPARTMENT OF HEALTH

The Department of Health (DOH) continues to emphasize the importance of active surveillance for human cases of West Nile Virus (WNV).

**Clinical Description**: Arboviral infections may be asymptomatic or may result in illnesses of variable severity sometimes associated with the central nervous system (CNS). Clinical syndrome can range from febrile headache to aseptic meningitis to encephalitis. Arboviral meningitis is characterized by fever, headache, stiff neck and pleocytosis. Arboviral encephalitis is characterized by fever, headache and altered mental status ranging from confusion to coma with or without signs of brain dysfunction.

**Clinical criteria:**

**I. Neuroinvasive**

Requires the presence of fever and at least one of the following, as documented by a physician and in the absence of a more likely clinical explanation:

Acutely altered mental status (e.g., disorientation, obtundation, stupor, or coma), or

Other acute signs of central or peripheral neurologic dysfunction (e.g., paresis or paralysis, nerve palsies, sensory deficits, abnormal reflexes, generalized convulsions, or abnormal movements), or

Pleocytosis (increased white blood cell concentration in cerebrospinal fluid [CSF]) associated with illness clinically compatible with meningitis (e.g., headache or stiff neck).

**II. Non-neuroinvasive**

The presence of documented fever, as measured by the patient or clinician, the absence of neuroinvasive disease, and the absence of a more likely clinical explanation for the illness. Involvement of non-neurological organs (e.g., heart, pancreas, liver) should be documented using standard clinical and laboratory criteria.

**Laboratory criteria:**

**I. Confirmed**

Four-fold or greater change in virus-specific serum antibody titer, or

Isolation of virus from or demonstration of specific viral antigen or genomic sequences in tissue, blood, CSF, or other body fluid, or

Virus-specific immunoglobulin M (IgM) antibodies demonstrated in CSF by antibody-capture enzyme immunoassay (EIA), or

Virus-specific IgM antibodies demonstrated in serum by antibody-capture EIA and confirmed by demonstration of virus-specific serum immunoglobulin G (IgG) antibodies in the same or a later specimen by another serologic assay (e.g., neutralization or hemagglutination inhibition).

**II. Probable**

Stable (less than or equal to a two-fold change) but elevated titer of virus-specific serum antibodies, or

Virus-specific serum IgM antibodies detected by antibody-capture EIA but with no available results of a confirmatory test for virus-specific serum IgG antibodies in the same or a later specimen.

**Case Definitions:** A case must meet one or more of the above clinical criteria and one or more of the above laboratory criteria.

| Send Case Report Forms via FAX to: | Laboratory Testing Info: | Questions: |
|---|---|---|
| (202) 442-8060 | (202) 535-2323 | (202) 442-5893 |

**Testing for West Nile Virus (WNV)**
Please submit >5.0 ml of serum (or plasma for virus isolation) and >1.0ml of CSF. Please do not submit whole blood. Convalescent specimens (2 weeks after initial specimen) should be clearly labeled as such so appropriate testing can be done. A copy of the case report must accompany each specimen/set of specimens submitted for testing.

Submitted by: _____ Date: _____

Hospital/Laboratory/Physician: _____ Phone No.: _____

Disease: _____ Outcome: ☐ Survived ☐ Died ☐ Unknown

**PATIENT INFORMATION**

Last Name:_____ First Name:_____

Address: _____ City: _____ State: Zip: _____

Home Phone: _____ Work Ph: _____ Other Ph: _____

Birth Date: _____ Sex: ☐ Male ☐ Female

Race: ☐ Black ☐ White ☐ Native American/Alaskan ☐ Asian/Pacific ☐ Unknown

(*Ethnicity*): ☐ Hispanic ☐ Non-Hispanic ☐ Unknown

*If Patient is a minor, Name of Parents(s): _____

Occupation/School: _____ ☐ Food Handler ☐ Child Caregiver ☐ Attends School/Daycare

Household contacts, names, ages:_____

**CLINICAL INFORMATION** Acute Illness ☐ Chronic Illness ☐ Patient Notified of Lab Result Yes ☐ No ☐

Onset Date: _____ Admission Date/Seen: _____ Discharge Date:_____

Symptoms and Duration:_____
_

Past medical history:
_____

Is the patient pregnant? Yes ☐ No☐ If yes, expected date of delivery?
_____

**DIAGNOSTIC TEST**

| Collection Date | Specimen Type | Test | Result |
|---|---|---|---|
| _____ | _____ | _____ | _____ |
| _____ | _____ | _____ | _____ |

Drug Resistant: ☐ Yes** ☐ No ☐ Unknown/Not Tested

** If Yes, list resistant Drugs:
_____

**TREATMENT**

| Date Started | Drug | Dosage | Duration |
|---|---|---|---|
| _____ | _____ | _____ | _____ |

Additional Comments:_____
____

_____
_____

# APPENDIX B
# WNV INFECTION DISEASE PRACTIONERS ALERT
# GOVERNMENT OF THE DISTRICT OF COLUMBIA
# DEPARTMENT OF HEALTH

**Division of Epidemiology-Disease Surveillance and Investigation**

**MEMORANDUM**

**TO:** Infection Control Practitioners District of Columbia Hospitals

**FROM:** John Davies-Cole, PhD, MPH, State Epidemiologist

**SUBJECT:** West Nile Virus Human Surveillance

**DATE:** June 20, 2009

In 2008, eight (8) positive West Nile virus test results were reported.

The primary objective of the DC Department of Health's Human West Nile Virus Surveillance Program is to rapidly detect human illness due to mosquito borne diseases, especially WNV.

In continued efforts towards this goal your assistance is valued and critical. Please immediately report all suspected cases of viral encephalitis and viral meningitis to the Department of Health via the viral meningitis / encephalitis case report form. For all hospitalized suspected cases of WNV:

- Submit laboratory samples (serum or cerebrospinal fluid) to the DC Public Health Lab. Call 202-535-2323 for specimen pick-up
- Submit a completed meningitis / encephalitis case report form for all suspected cases via Fax 202-442-4796
- Laboratory results will be sent to both the hospital infection control practitioner (ICP) and the hospital lab
- Request for further clinical information or specimens will be sent to the ICP

Thank you in advance for your assistance. Should you have any questions please feel free to contact the Division of Epidemiology-Disease Surveillance and Investigation at 202-442-9177 or 202-442-5893.

# APPENDIX C
# WNV VETERINARIAN'S ALERT
# GOVERNMENT OF THE DISTRICT OF COLUMBIA
# DEPARTMENT OF HEALTH

**Bureau of Community Hygiene**
**Animal Disease Prevention Division**

**MEMORANDUM**

**TO:** District of Columbia Practicing Veterinarians

**FROM:** Peggy Keller, MPH, Chief, Bureau of Community Hygiene

**SUBJECT:** West Nile Virus (WNV) Update

**DATE:** April 10, 2009

In anticipation of the upcoming West Nile Virus (WNV) season in our area, we are updating the following information to assist you in identifying, testing and reporting West Nile virus cases.

**Surveillance and control plans:** The District of Columbia Department of Health has developed an Arbovirus Surveillance and Response Plan for the year 2009. This plan outlines WNV surveillance for humans, birds and mammals, and mosquitoes. The plan also provides a prevention, control, and response program for WNV for the District of Columbia. The plan as well as prevention and control measures, periodic health alerts and weekly surveillance reports are available on the Department of Health website at www.doh.dc.gov. Clients should be advised to apply the same general guidelines proposed for people to their pets to reduce the chance of their pet's exposure to West Nile virus.

**Reporting and testing of ill animals:** In animals ill with encephalitis that you may encounter in your practice, rabies is still a more likely diagnosis than WNV, and is a more critical diagnosis in regards to rapid provision of preventive treatment to persons exposed. If rabies is suspected and exposures have occurred, such as a bite or other human contact with the animal's saliva, the animal must be euthanized and submitted for rabies testing. That submission should be coordinated with the Department of Health. For horses from a WNV affected area that test negative for rabies, the Laboratory will subsequently test the brain specimens for WNV. Routine WNV testing of the brains of additional rabies-negative animals may be arranged depending on resources and priorities.

Clinical disease and transmission caused by WNV infection in dogs and cats was documented in 2002. Clinical case criteria that have been helpful in narrowing down human encephalitis cases for WNV testing include fever, altered mental status, muscle weakness by neurologic exam or EMG, and abnormal CSF with increased protein, pleiocytosis, and lymphocytosis. Animals ill with encephalitis that do not require euthanasia and rabies testing and are from WNV affected

areas may be tested for WNV. The District of Columbia Public Health Laboratory will conduct serologic and virus isolation testing for WNV. Because rabies is a more likely diagnosis in small companion animals, and pets are unlikely to become clinically ill with WNV, please consult with Department of Health Animal Disease Control Division if you have questions regarding sample submission criteria.

For encephalitis cases in domestic animals/livestock, Department of Health, Animal Disease Prevention Division must be consulted before submitting samples. Samples collected for antibody detection should be collected in red top (clot) tubes and should be paired samples. Virus isolation has, to date, been successful with brain, spinal cord, and kidney.

**Prevention:** Efforts should be directed to minimize exposure to mosquitoes. The single most important control effort should be to eliminate or minimize mosquito breeding habitat near dwellings or stable areas. Clients should be directed to police their areas for cans, tires, clogged gutters or other items which hold standing water that can be used as breeding sites for mosquitoes. This includes swimming pools that are not opened and not maintained in good condition. Water troughs and water dishes should be kept in good condition, water changed every three days, and maintained such that they do not become breeding sites for mosquitoes. By minimizing breeding sites of the WNV carrier mosquito, the number of adult mosquitoes and potentially virus positive mosquitoes that interact with mammalian hosts can be decreased.

In addition to decreasing the number of breeding sites for the vector, keeping animals in during dawn and dusk when Culex spp. is most active may decrease exposure to this mosquito species that prefers to feed in twilight. Insect spray may be effective for short periods of time, but will not have a lasting effect.

**Summary**: The risk of acquiring WNV infection from horses or other mammals as a clinician examining these animals is undocumented. WNV is vector-borne, however it is prudent to practice universal precautions when handling animals with neurologic signs, especially since rabies, a differential rule-out, can be transmitted directly from an infected animal.

**For further questions and submission criteria, please call the District of Columbia Department of Health, Animal Disease Prevention Division, 202-535-2323.**

# APPENDIX D

## Neuroinvasive and Non-Neuroinvasive Domestic Arboviral Diseases

(includes diseases caused by California serogroup viruses; eastern and western equine encephalitis viruses; and Powassan, St. Louis encephalitis, and West Nile viruses)

## 2004 CDC Case Definition

Clinical description

Arboviral infections may be asymptomatic or may result in febrile illnesses of variable severity sometimes associated with central nervous system (CNS) involvement. When the CNS is affected, clinical syndromes include aseptic meningitis, myelitis and encephalitis, which are clinically indistinguishable from similar syndromes caused by other viruses. Arboviral meningitis is usually characterized by fever, headache, stiff neck, and pleocytosis in cerebrospinal fluid. Arboviral myelitis is usually characterized by fever and acute bulbar or limb paresis or flaccid paralysis. Arboviral encephalitis is usually characterized by fever, headache, and altered mental status ranging from confusion to coma with or without additional signs of brain dysfunction. Less common neurological syndromes can include cranial and peripheral neuritis or other neuropathies, including Guillain-Barré syndrome.

Non-neuroinvasive syndromes caused by these usually neurotropic arboviruses can rarely include myocarditis, pancreatitis, or hepatitis. In addition, they may cause febrile illnesses (e.g., West Nile fever [WNF]) that are non-localized, self-limited illnesses with headache, myalgias, arthralgias, and sometimes accompanied by skin rash or lymphadenopathy. Laboratory-confirmed arboviral illnesses lacking documented fever can occur, and overlap among the various clinical syndromes is common.

**Clinical criteria for diagnosis**

Cases of arboviral disease are classified either as neuroinvasive or non-neuroinvasive, according to the following criteria:

Neuroinvasive disease requires the presence of fever and at least one of the following, as documented by a physician and in the absence of a more likely clinical explanation:

- Acutely altered mental status (e.g., disorientation, obtundation, stupor, or coma), or
- Other acute signs of central or peripheral neurologic dysfunction (e.g., paresis or paralysis, nerve palsies, sensory deficits, abnormal reflexes, generalized convulsions, or abnormal movements), or
- Pleocytosis (increased white blood cell concentration in cerebrospinal fluid [CSF]) associated with illness clinically compatible with meningitis (e.g., headache or stiff neck).

Non-neuroinvasive disease requires, at minimum, the presence of documented fever, as measured by the patient or clinician, the absence of neuroinvasive disease (above), and the absence of a more likely clinical explanation for the illness. Involvement of non-neurological organs (e.g., heart, pancreas, liver) should be documented using standard clinical and laboratory criteria.

Laboratory criteria for diagnosis

Cases of arboviral disease are also classified either as confirmed or probable, according to the following laboratory criteria:

<u>Confirmed case :</u>

- Four-fold or greater change in virus-specific serum antibody titer, or

- Isolation of virus from or demonstration of specific viral antigen or genomic sequences in tissue, blood, CSF, or other body fluid, or
- Virus-specific immunoglobulin M (IgM) antibodies demonstrated in CSF by antibody-capture enzyme immunoassay (EIA), or
- Virus-specific IgM antibodies demonstrated in serum by antibody-capture EIA and confirmed by demonstration of virus-specific serum immunoglobulin G (IgG) antibodies in the same or a later specimen by another serologic assay (e.g., neutralization or hemagglutination inhibition).

Probable case :

- Stable (less than or equal to a two-fold change) but elevated titer of virus-specific serum antibodies, or
- Virus-specific serum IgM antibodies detected by antibody-capture EIA but with no available results of a confirmatory test for virus-specific serum IgG antibodies in the same or a later specimen.

Case definition

A case must meet one or more of the above clinical criteria and one or more of the above laboratory criteria.

Comment

Because closely related arboviruses exhibit serologic cross-reactivity, positive results of serologic tests using antigens from a single arbovirus can be misleading. In some circumstances (e.g., in areas where two or more closely related arboviruses occur, or in imported arboviral disease cases), it may be epidemiologically important to attempt to pinpoint the infecting virus by conducting cross-neutralization tests using an appropriate battery of closely related viruses. This is essential, for example, in determining that antibodies detected against St. Louis encephalitis virus are not the result of an infection with West Nile (or dengue) virus, or vice versa, in areas where both of these viruses occur. Because dengue fever and West Nile fever can be clinically indistinguishable, the importance of a recent travel history and appropriate serologic testing cannot be overemphasized. In some persons, West Nile virus-specific serum IgM antibody can wane slowly and be detectable for more than one year following infection. Therefore, in areas where West Nile virus has circulated in the recent past, the co-existence of West Nile virus-specific IgM antibody and illness in a given case may be coincidental and unrelated. In those areas, the testing of serially collected serum specimens assumes added importance.

The seasonality of arboviral transmission is variable and depends on the geographic location of exposure, the specific cycles of viral transmission, and local climatic conditions. Reporting should be etiology-specific (see below; the six diseases printed in bold are nationally reportable to CDC):

- **St. Louis encephalitis virus disease**
- **West Nile virus disease**
- **Powassan virus disease**
- **Eastern equine encephalitis virus disease**
- **Western equine encephalitis virus disease**
- **California serogroup virus disease** (includes infections with the following viruses: California encephalitis, Jamestown Canyon, Keystone, La Crosse, snowshoe hare, and trivittatus)

Note: Due to the continued risk of unintentional or intentional introduction of exotic arboviruses into the United States (e.g., Venezuelan equine encephalitis virus), or the reemergence of indigenous epidemic arboviruses (e.g., St. Louis encephalitis and western equine encephalitis

viruses), physicians and local public health officials should maintain a high index of clinical suspicion for cases of potential exotic or unusual arboviral etiology, and consider early consultation with arboviral disease experts at state health departments and CDC.

# APPENDIX E
# "Vector-Borne Infectious Diseases Control Emergency Act of 2005"

THE COUNCIL OF THE DISTRICT OF COLUMBIA

To establish procedures for the control of public health nuisances relating to vector-borne infectious diseases including prohibiting certain activities that increase the probability that standing, untreated water could develop on a property and create a public health nuisance, authorizing the Mayor to inspect property to determine whether a public health nuisance exists, authorizing the Mayor to take corrective action to abate a public health nuisance, establishing a fund to cover the costs of corrective actions to abate public health nuisances, providing penalties for violations of this act, and requiring the Mayor to issue rules to implement this act, and to repeal unnecessary regulations pertaining to standing water on property.

APPROVED BY THE COUNCIL OF THE DISTRICT OF COLUMBIA, That this act may be cited as the "Vector-Borne Infectious Diseases Control Emergency Act of 2005".

Sec. 2. Definitions.

For the purposes of this act, the term:
(1) "Abate" means to eliminate a public health nuisance, or to reduce the degree or intensity of a public health nuisance.
(2) "District" means the District of Columbia.
(3) "Person" means any individual; partnership; corporation, including a government corporation; trust association; firm; joint stock company; organization; commission; the District or federal government; or any other entity.
(4) "Property" means land, including any water thereon, and improvements to land.
(5) "Public health nuisance" means:
(A) Any property, including water, that supports the development, attraction, or harborage of vectors;
(B) Any property that has a vessel, container, or other structure holding water that provides a breeding place for vectors; or
(C) Any activity that supports the development, attraction, or harborage of vectors, or that facilitates the introduction or spread of vectors.
(6) "Vector" means any animal capable of transmitting the causative agent of human or animal disease or capable of producing human discomfort or injury, including mosquitoes, flies, mites, ticks, or other arthropods.

Sec. 3. Prohibited activities.

(A) No person shall:
(1) Cause or allow the open dumping of any tire;
(2) Cause or allow the open burning of any tire;
(3) Cause or allow the storage of any tire unless the owner or operator of the property where the tire is stored takes measures to prevent the tire from accumulating water by covering or altering the tire; or
(4) Cause or allow a tire to be used in playground equipment unless the tire is altered to prevent the accumulation of water.
(B) No person shall cause or allow standing water on property unless the person takes measures to prevent the breeding or harborage of vectors, including the following:
(1) Draining or replacing water frequently enough to prevent vector breeding;
(2) Covering water-bearing containers with fine netting to prevent access by vectors; or
(3) Applying larvicide to the standing water.

Sec. 4. Inspection.

(A) The Mayor, acting on the Mayor's own information or observation, or on the information or observation of another person, may inspect occupied or vacant property to investigate an allegation of a public health nuisance.

(B) Upon the presentation of appropriate credentials to the owner or occupant of the property, the Mayor shall conduct the inspection during reasonable times and in a reasonable manner.
(C) If the owner or occupant of the property denies the Mayor access for the purposes of this section, the Mayor may apply to a court of competent jurisdiction for a search warrant.
(D) If, as a result of an inspection, the Mayor determines that a public health nuisance exists, the Mayor may order the owner or occupant to take appropriate action to abate the public health nuisance in accordance with section 6.

Sec. 5. Prima facie evidence of a public health nuisance.

The presence of vectors in their developmental stages on a property, or in a vessel, container, or other structure on a property, shall be prima facie evidence of a public health nuisance.

Sec. 6. Abatement of a public health nuisance.

(A) When the Mayor determines that a public health nuisance exists on a property, the Mayor shall issue a notice of violation to the person alleged to have created the public health nuisance or the owner or occupant of the property. The Mayor may serve the notice of violation on the owner, occupant, or any other responsible person at the premises, deliver the notice of violation by prepaid mail, return receipt requested to the owner or occupant of the property, or post the notice in a conspicuous place on the property in violation. The notice of violation shall include the following:

(1) The location, date, and time that the public health nuisance took place or that the Mayor investigated the public health nuisance;

(2) The nature of public health nuisance;

(3) The time, not later than 10 days, within which the public health nuisance shall be abated;

(4) The specific corrective actions the owner or occupant shall take to abate the public health nuisance; and

(5) A statement that failure to abate the public health nuisance shall constitute a violation of this act, with each day of violation consisting of a separate offense.

(B) Upon receipt of a notice of violation, the person responsible for the property shall abate the public health nuisance within the time specified in the notice of violation. The Mayor may grant additional time to abate the public health nuisance upon a request from the responsible person and a good faith showing that the person has made an effort to abate the public health nuisance and that a longer time for abatement is necessary.

Sec. 7. Corrective actions by District to abate a public health nuisance.

(A) Subject to the availability of appropriations, the Mayor may undertake actions to correct certain health hazards that have resulted from the development, attraction, or harborage or vectors, including cleanup, abatement, and preventive measures, if the following conditions exist:

(1) The District needs to take an action in order to protect human health; and

(2) One or more of the following conditions exist:

(a) The action is required to protect public space;

(b) No person can be found who is the owner of the property in question, and is capable of proper implementation of the required corrective action within 30 days of the posting of notice on the property in question that violation of this act has occurred, or shorter period, if so determined by the Mayor, as may be necessary to protect human health;

(c) A situation exists that requires immediate action by the Mayor to protect human health; or

(d) The responsible party has failed or refused to comply within 30 days of a mayoral order for compliance.

(e) If the District incurs costs for undertaking any corrective or enforcement action to abate development, attraction, or harborage of vectors, all parties found to be liable by the Mayor shall be jointly and severally liable to the District government for the costs incurred by the District. In addition to any other enforcement action, the Mayor may assess any reasonable costs for correcting the condition and any related expenses as a tax against the property, carry the tax on the regular tax rolls, and collect the tax in the same manner as real estate taxes are collected.

Sec. 8. Vector-Borne Infectious Diseases Control Fund.

(A) There is established the Vector-Borne Infectious Disease Control Fund ("Fund") as a nonlapsing, revolving fund, to be administered by the Mayor as an agency fund as defined in section 373(2)(I) of Title 47 of the District of Columbia Official Code, to be used exclusively for the purposes stated in subsection (b) of this section.
(B) Disbursements from the Fund may be used by the District to undertake actions to correct certain public health hazards that have resulted from the harborage of vectors, including cleanup, abatement, and preventive measures, in accordance with section 7(a), and to cover the administrative and operational costs incurred by the District in the implementation of the corrective actions.
(C) The Fund shall be financed through fines, civil penalties, costs and judgments recovered, and monies received as reimbursement by the District government pursuant to this act and regulations promulgated by the Mayor.
(D) The Fund shall be accounted for under procedures established pursuant to subchapter V of Chapter 3 of Title 47 of the District of Columbia Official Code.
(E) Nothing in this section shall be construed to make the District government responsible for corrective action costs to any person in excess of the monies in the Fund.

Sec.9. Penalties.

A violation of this act or the rules issued under authority of this act shall be a civil infraction for the purposes of the Department of Consumer and Regulatory Affairs Civil Infractions Act of 1985, effective October 5, 1985 (D.C. Law 6-42; D.C. Official Code § 2-1801.01 et seq.) ("Civil Infractions Act"). Civil fines, penalties, and fees may be imposed as sanctions for any infraction of the provisions of this act, or the rules issued under authority of this act, pursuant to Titles I-III of the Civil Infractions Act. Adjudication of any infraction shall be pursuant to Titles I-III of the Civil Infractions Act.

Sec. 10. Rules.

The Mayor, pursuant to Title I of the District of Columbia Administrative Procedure Act, approved October 21, 1968 (82 Stat. 1204; D.C. Official Code § 2-501 et seq.), shall issue rules to implement the provisions of this act.

Sec. 11. Repealer.

Subsections 106.1 and 106.2 of Title 22 of the District of Columbia Municipal Regulations (Public Health and Medicine) are repealed.

Sec. 12. Fiscal impact statement.

The Council adopts the fiscal impact statement in the committee report as the fiscal impact statement required by section 602(c)(3) of the District of Columbia Home Rule Act, approved December 24, 1973 (87 Stat. 813; D.C. Official Code § 1-206.02©(3)).

Sec. 13. Effective date.

This act shall take effect following approval by the Mayor, (or in the event of veto by the Mayor, action by the Council to override the veto), a 30-day period of Congressional review as provided in section 602©(1) of the District of Columbia Home Rule Act, approved December 24, 1973 (87 Stat. 813; D.C. Official Code § 1-206.02©(1)), and publication in the District of Columbia Register.

# APPENDIX F
# TIRE ROUND-UP CAMPAIGN

**Purpose:**
To eliminate potential mosquito-breeding sites by removing discarded tires that serve as reservoirs for water and to develop a program to recycle collected tires.

The District of Columbia invests considerable resources to support recycling as a way to protect our environment. By bringing products manufactured from scrap tires "full-circle" back to the community, people can see the results of everyone's recycling efforts.

This pilot project will highlight ways in which recycled scrap tire products can be used in the improvement of community facilities such as playgrounds, parks, buildings, walkways, arenas, etc. There are increasing opportunities for communities to use and benefit from the growing range of tire-recycling products. The project will provide an opportunity for community groups to observe and assess the value of using recycled scrap tire products. This activity is dependent upon adequate funding.

**Actions:**
1. Develop and finalize plan to collect tires from residents at one location, such as, RFK Stadium, for recycling. Through educational outreach efforts, residents will be requested to bring their old tires to the collection site.
2. Coordinate with Department of Public Works, DPW, to remove tires from resident homes and transport to collection site.
3. Prepare Statement of Work for Office of Contracting and Procurement, OCP, to seek a qualified vendor to develop a tire-recycling program at one location.
4. Develop Public-Private partnerships with stakeholders to collect and recycle tires.
5. Coordinate with other agencies, such as DCRA, for a multi-agency plan.

## APPENDIX G
## OUTREACH AND EDUCATION SEASONAL INFORMATION

| Pre-Season (April-May) | Mid-Season (June-July) | Late Season (Aug-Sept) |
|---|---|---|
| ◷ The DC DOH is prepared<br>◷ Mosquitoes can carry disease<br>◷ Clean up standing water around your home<br>◷ Persons over age 50 are at a higher risk for serious illness from WNV<br>◷ DC DOH will not be collecting birds this season | ◷ Continue Pre-Season messages<br>◷ The DC DOH is working to protect you<br>◷ Wear personal protection, bug spray with DEET when outdoors<br>◷ Risk from WNV is increasing as mosquitoes start to appear<br>◷ Dead birds need to be disposed of in double plastic bags | ◷ Continue Pre and Mid Season messages<br>◷ Mild, flu-like symptoms are not dangerous, if you have headache with high fever, disorientation and muscle pain with weakness, seek medical attention<br>◷ Other animals can become infected, contact your veterinarian if you have particular concern about a domestic or farm animal |
| **EMPHASIS:**<br>Eliminate standing water and potential mosquito breeding sites | **EMPHASIS:**<br>Eliminate standing water and potential mosquito breeding sites | **EMPHASIS:**<br>Eliminate standing water and potential mosquito breeding sites |

# APPENDIX H
# WORK PLAN FOR MOSQUITO ARBOVIRUS DISTRICT OF COLUMBIA COLLABORATIVE SURVEILLANCE PROGRAM

**May 2009**

## I. Purpose

To assess the threat of West Nile virus (WNV), malaria and other arboviruses in the District of Columbia by determining the presence, distribution, and relative abundance of potential vector mosquito species and to test collected material to determine the presence of arborviral pathogens. This information will be used to guide public health protection activities.

## II. Participants

Principal agencies include: the DC Department of Health (DCDOH); US Army Center for Health Promotion and Preventive Medicine-North (USACHPPM-North); and DOD facilities in Washington DC.

Selected points of contacts (POCs) are provided in enclosure one. A private agency from the Consortium for Conservation Medicine, located at 460 West 34th Street 17th floor, in New York may also conduct mosquito testing within the District of Columbia.

## III. Schedule

| Period | Activity |
|---|---|
| April – May | ventory and Test all Trapping Equipment and Order Supplies (including pesticides) |
| May 9 - June 5 | nitial Larval Survey, identification of field sites and mosquito control |
| May 30 | Training in Mosquito ID and Trapping Methods |
| June 1 – Oct 30 (or first killing frost) | Adult Mosquito Trapping and Data Submission |
| July 7 – Aug 23 | Follow-up Larval Surveillance and Control |
| April 10 – Oct 30 (or first killing frost) | Compile and Catalog all Field Data in GIS |

## IV. Mosquito Collection

### A. Larval Surveillance

**i.** Background – Larval surveillance shall be conducted by visual examination through the use of a dipper and/or the use of improvised suction devices (e.g., modified hand powered bilge pump) in small water-holding cavities. Presence or absence of larvae shall be determined. Field notes shall include: surveyor, date, location, larval presence/absence, and treatment (if done). Relative abundance of larvae can be recorded by standardizing the number of dips (e.g., 5 per site). If larval identification is not possible then this should be noted. Emphasis will be placed on immediate treatment if possible and if appropriate. Treatment may consist of removing debris from a culvert,

turning over a wheelbarrow, or straightening a wrinkled tarp. In certain circumstances larvae can be collected and returned to laboratory for rearing and identification.

**ii.** **Techniques -** There are several recommendations for successful dipping. Larvae are sensitive to water movement and change in light intensity (e.g., your shadow) and will quickly hide if so disturbed. The dipper should be directed at making a quick but gentle sweep at the water surface. Place the dipper at an angle as it enters the water so that surface water enters the cup. Continue sweeping across the water surface until the cup is one-half to three-quarters full. Avoid filling the cup all the way because larvae could escape before the dipper is righted and removed from the water. Larvae that are disturbed from the water surface will escape to deeper water, resurfacing only when air is needed. Pausing between dips or changing dipping locations will encourage larvae to resurface. If there is vegetation in the water, try dipping where the water meets the leaves or stems. In this case, do not sweep the dipper. Slowly enter it into the water so that water is sucked out of the vegetation into the dipper.

**B.** **Adult Surveillance** – Adult surveillance shall be conducted through the use of gravid traps, CDC Light Traps augmented by dry ice, and $CO_2$ generating Propane Traps (Mosquito Magnet™). Additionally Ovitraps shall be used to determine the presence of container breeding potential vectors, but reared adults from these cups will not be routinely tested for pathogen presence. Trap descriptions, advantages and disadvantages are presented in Enclosure 2.

**i.** **CDC Gravid Traps** – The gravid mosquito trap is single most important tool to assess WNV in the mosquito population. The gravid trap traps and collects female mosquitoes that have recently taken a blood meal and are ready to lay eggs, which in turn greatly increases the probability of detecting the virus, if it is present.

**a.** **Placement**. Locate the trap in or near residential areas in order to collect container-breeding Culex spp.. Traps should be located in areas protected from extreme environmental conditions (e.g., wind and direct sun) and in secure areas (not conspicuous) where they are not disturbed or vandalized. Appropriate trap sites include: utility yards, window wells, stairwells, storm drains, boatyards, animal stables, transformer pits, cluttered backyards, tire storage yards, sewage treatment plants, near garden plots, and cemeteries. It is desirable to have some type of overhead cover (e.g., shrubs or overhangs) so that the tub is not easily flooded in the event of rain. Locate traps where they can be visited daily. If after several visits the trap does not appear productive, move it to an alternate location. The primary goal is to collect blood-fed female mosquitoes. Greater yield per trap is a greater priority than consistent sites that may have poor yields. Traps should be spaced more than150 feet apart. If trapping at least two consecutive nights, set traps in the morning and, at the same time the next morning, collect the mosquitoes from the trap and switch the battery as preparation for the next trap night. This saves one trip back to the trap but may expose some early –trapped mosquitoes to the mid-day sun. If trapping only one night, set trap out in mid to late afternoon and pick up early the next morning. This avoids trapped material from being exposed to high-noon temperatures.

**b.** **Setup.** If using the trap for the first time, season the plastic tubs to rid them of insect repellent properties associated with chemical components found in some plastics, and can be accomplished by immersing the tubs in a muddy pond for several days. At least 2 days before trapping, mix, in a gallon jug or jerry can, at least 1 cup of

rabbit pellet food or horse feed alfalfa cubes (available from pet or feed stores) per 1 gallon of aged water. Let the concentrate incubate in a protected (inaccessible to mosquitoes) location. At the trapping site put approximately 1/4 gallon of the premixed rabbit food concentrate to the tub and add aged water collected from a nearby natural source (e.g., pond or stream) or brought along with you, to bring the water level up to within 2 inches of the bottom edge of the fan housing tube. Position the trap bracket securely over the center of the tub and slide the collection bag over the top of the trap tube. Be sure the bag is not askew and that it remains properly positioned, even if breezes pick up. Attach the battery to the terminal wires and make sure it is securely positioned, and test the trap making sure the fan turns freely and draws the air from below. Note: the fan will spin in the wrong direction if polarity is reversed. Assign the trap a number and note its location on a map or GPS mapping system.

**c.** **Servicing.** Visit the trap in the early AM so caught specimens do not cook. Carefully remove the trap bag containing mosquitoes and replace with an empty one. Tie off the open end, and if the bag is not easily hung in the servicing vehicle, place net props (e.g., tongue depressors) around the bag so that it does not collapse and the mosquitoes are not crushed. Note in a field notebook the general number of mosquitoes taken from each particular trap (to be verified later in the laboratory) and any other relevant information. The water can be used for multiple trap nights within a week (top it off with aged water to make up for evaporation), but dump the water, where it will evaporate, at the conclusion of one week of trapping and repeat procedure. If this is not done, eggs potentially laid could hatch thereby contributing to mosquito breeding in the vicinity. (Note: prior to emptying water, water surface can be examined for the presence of eggs and, if present, collected in specimen jars for rearing and species confirmation.

**ii.** **CDC Light Traps.** The miniature light trap collects primarily host-seeking female mosquitoes. The addition of a carbon dioxide ($CO_2$) attractant (e.g. dry ice) substantially increases the number and species diversity of collected mosquitoes and is, therefore, essential.

**a.** **Placement**. Locate the trap in generally moist areas (near ponds, swamps, cattail marshes, creeks, wet fields, storm drains, culverts, or flooded woods), protected from the wind. Generally wood margins are good because of the diversity of habitat. In urban environments, place the traps near shrubs, refuse areas, cluttered back yards, cemeteries, and woods. Place in secure areas (not conspicuous) and where they will not disturbed or vandalized and **make sure there are no competing light sources**. This can best be verified by visiting potential sites at night. Locate traps where they can be visited daily. If after several visits, the trap does not appear productive, move it to an alternate location. Traps should be spaced more than 150 feet apart. If trapping at least two consecutive nights, set the trap out in the morning and, at the same time the next morning, pick-up trap material and switch battery in preparation for the next trap night. This saves one trip back to the trap but may expose some early –trapped mosquitoes to the mid-day sun. If trapping only one night, place trap out in mid to late afternoon and pick up early the next morning. This avoids trapped material from being exposed to high-noon temperatures.

**b.** **Setup.** Hang trap approximately 7 feet off the ground. Using a bent wire coat hanger between a tree limb and trap speeds up the set up and marks a consistent attachment point. Attach the battery to the terminal wires and make sure it is securely

positioned, and test the trap making sure the fan turns freely and draws the air from below. If there are dipswitches controlling bulb and fan activation, make sure it is set to run during light and dark periods so that daytime biters (e.g., Aedes albopictus) will be captured. Note: the fan will spin in the wrong direction if polarity is reversed. Fill an insulated container holding 2-3 lbs. of commercial chunk dry ice and hang it directly above or right next to the trap. Assign the trap a number and note its location on a map or GPS mapping system.

**c.** **Servicing.** Visit the trap in the early morning so collected specimens do not get dried out by the sun.. Carefully remove the trap bag containing mosquitoes and replace with an empty one. Tie off the open end, and if the bag is not easily hung in the servicing vehicle, place net props (e.g., tongue depressors) around the bag so that it does not collapse and the mosquitoes are not crushed. Note in a field notebook the general number of mosquitoes taken from each particular trap (to be verified later in the laboratory) and any other relevant information.

**iii.** **Propane-Generated $CO_2$ Traps** (e.g., Mosquito Magnet™ ) can collect large numbers of day or nighttime biting mosquitoes. Uses $CO_2$, heat, and a chemical lure (octonol) to capture a variety of mosquito species.

**a.** **Placement**. Locate the trap in a secure area where theft is not possible (these traps are expensive). Generally place in the same location as CDC light traps. Competing light sources are not a problem. Locate traps where they can be visited daily. Even though these traps run continuously, trap bags should be removed frequently because specimens dry out. If after several visits the trap does not appear productive, move it to an alternate location. Traps should be spaced more than 150 feet apart (refer to manufacturer's instructions).

**b.** **Setup.** Indicate in field records if octonol (synthesized ox breath) lure is being used. Refer to trap directions for starting catalytic converter and safely running trap. Assign the trap a number and note its location on a map or GPS mapping system.

**c.** **Servicing.** Even though these traps run continuously, trap bags should be removed frequently (several times per week) because specimens will dry out and turn brittle. Carefully remove the trap bag containing mosquitoes and replace with an empty one. Tie off the open end, and if the bag and hang or prop up the bag in the servicing vehicle so that it does not collapse and the mosquitoes are not crushed. Note in a field notebook the general number of mosquitoes taken from each particular trap (to be verified later in the laboratory) and any other relevant information.

**V. Specimen Processing**

Do not expose mosquitoes to direct sunlight or extreme temperatures (e.g., enclosed vehicle). The mosquitoes must be fresh for viral testing. Captured mosquitoes can be transferred from the net bag to a more compact handling container (e.g., paper ice cream container with a rubberized aperture) using a battery-powered aspirator or HEPA-protected oral aspirator. Upon return to your processing facility, place the handling container or entire bag containing mosquitoes in a normal freezer (< 32 degrees F) for at least 30 minutes [ultra low freezer (-60 degrees F) – at least 15 minutes). Empty frozen mosquitoes on a chilled surface (chill table or enamel pan nested in an ice bath) examine with a hand lens or dissecting microscope. Mosquitoes should be handled carefully and promptly. As

mosquitoes dry they become brittle and legs/body parts break off. It is advisable to have a fresh, clean sheet of paper underneath the contents of each trap. Also, forceps should be wiped clean between each filling each pooling tube. First remove all non-mosquitoes. Next separate all male mosquitoes and note the number in the data sheet remarks section (but do not pool). Either discard or save the males for your own reference purposes. After all non-mosquito and male specimens are removed, females are then placed in vials as a group (pool) of 1 to 25 specimens of the same genus or species, which were collected from the same trap. If expertise is available, sort to species. For West Nile virus, members of the genus Culex will be given priority for pooling. In particular the Culex species listed in Table 2 (below) that occur in the DC area. The urban container breeding and/or non-native species Aedes aegypti, Ae. albopictus and Ochlerotatus japonicus merit examination as well and should be pooled if collected. For malaria, the Anopheles mosquitoes are the vectors and will be tested for this pathogen. If expertise in species identification is not available, sort to the best of your ability. Package and ship specimens IAW viral assay protocol. Record all required data and make sure pool vials are clearly labeled. A list of mosquito species that have tested positive in the field is provided in Table 2. Species with an asterisk (*) do not normally occur in the District of Columbia.

**VI. Trapping Frequency/Weekly Schedule/Timing**

Ideally the traps at any trap site should be run **two nights per week**. It is best to trap at the beginning of the week; Monday, Tuesday (and/or Wednesday), to allow time for sorting and express mailing specimens before the weekend. This also allows for adjustments if there is some reason you can't trap on a given night (e.g., storms, holidays). Remember, the attractant concentrate needs to incubate for at least 2 days, so it should be prepared NLT **THURSDAY** of the prior week. If trapping at least two consecutive nights, set the trap in the morning, and then, at the same time the next morning, pick-up trap material and switch battery in preparation for the next trap night. This saves one trip back to the trap but may expose some early–trapped mosquitoes to the noon-day sun. If trapping only one night, set trap in mid to late afternoon and pick up early the next morning. This avoids trapped material from being exposed to high-noon temperatures.

**VII. Trapping Scheme**

There will be approximately 40 sites being sampled throughout the season. A **site** can contain one or more traps (several of the military properties have more than 6 traps at a site). The traps at a particular site can be of different types. Individual trap locations should remain relatively constant. If a trap is unproductive after a few weeks, it should be moved to another location. If this is done, **give the newly located trap a new identification code or number** (and add coordinates to your GPS mapping system). Ideally the trap sites near wooded wet areas (e.g., C&O Canal, Potomac River, Anacostia River, woodland ponds/streams) should have at least one gravid and one CDC light trap or a Mosquito Magnet. This is because the gravid trap will not normally catch Anopheles spp mosquitoes (Malaria vector) but the others will. Although not distributed on a strict grid pattern, the trap sites are spaced with care to provide uniform coverage. Considering the total number of traps used (remember, more than one trap can be at a site) there will be at least one trap per square mile within the District.

**VIII. Sample Transport to Lab for Testing**

Collected specimens shall be overnight shipped to the DC Public Health Lab or delivered to the lab, by arrangement, on a weekly basis. If samples are to be hand-delivered, please call the lab in advance to get information on security requirements. Samples should be in an insulated box or cooler with several chill packs (not dry ice).

**IX. Data Reporting**

Mosquito collectors should enter pooling data on a standard data sheet. A data sheet must accompany all submitted specimens. Once specimens arrive at the Lab, they will be logged in, reviewed, and tested. A weekly report will be transmitted by e-mail to all collaborators.

**X. Information Technology (IT)**

Data generated from this project will be used, by agreement, for geo-information purposes including Remotely Sensed Epidemic Surveillance (RSEPIS), and Epidemic Surveillance Database (ESDB) projects. This is research headed by Dr. James Wilson, Georgetown University Medical College.

**XI. Personal Safety**

Personal safety should be a priority throughout the project duration. It is best to travel in teams of 2 to trap sites. A mobile phone for field personnel is recommended. Do not transport dry ice in a closed vehicle. Do not handle dry ice without gloves. Do not break dry ice blocks without wearing safety glasses. Wearing light colored, long sleeve shirts and long pants is advisable to reduce the potential of being bitten by daytime mosquito biters and to detect and remove ticks on clothing. The use of skin repellent containing at least 30% concentration of DEET and a clothing repellent containing permethrin is encouraged if trapping in an area where daytime biting mosquito species (e.g., Aedes albopictus) and/or ticks occur. However measures should be taken to not contaminate traps and equipment with repellent. This is best done by applying repellent while still at the office, and then thoroughly washing hands with soap and water prior to handling traps. Field staff should have personal protective equipment, gloves and a N-95 dust mask at a minimum.

## SELECTED, COMMERCIALLY-AVAILABLE MOSQUITO SURVEILLANCE TRAPS*

| TRAP & DESCRIPTION | ADVANTAGES | DISADVANTAGES |
|---|---|---|
| **GRAVID TRAP**<br><br>(AKA CDC Gravid trap, Reiter Trap)<br>Plastic basin (14"x10"x7" ) holding synthetic sewage (e.g., fermented rabbit/horse chow in water), updraft fan in cross-bracketed 3.25"D PVC pipe, net collection bag at top, powered by 6VDC sealed rechargeable battery.<br>Variation includes a tool-box fan/collection canister housing. | Best use: Culex collection for pathogen testing, population density, breeding source determination<br>Selective for large numbers of Gravid (and likely fed) Culex spp, esp. pipiens.<br>Will catch smaller numbers of Ae.albopictus and Och. japonicus<br>Low cost, low tech<br>Few non-targets | Limited species caught<br>Specimens go through fan (not so in the tool box model)<br>If neglected can be breeding source<br>Need advance preparation of synthetic sewage attractant<br>Stinks |
| **CDC LIGHT TRAP WITH $CO_2$**<br>(AKA SSAM Trap, CDC Miniature Light Trap, ABC Trap, New Standard Miniature Light Trap)<br>Tubular acrylic or PVC trap body approx. 3.5"DX5" tall, approx. 14"D removable lid, down-draft fan below screen and 4W minibulb, net bag or vented collection canister hangs below, powered by 6VDC sealed rechargeable or 4 D-cell batteries<br>Needs insulated canister for dry ice. | Best use: species composition, population density, pathogen testing, breeding source determination<br>Good for Culex, Culisita, Coquillettidia, Uranotaenia, Anopheles<br>Diverse mosquito trap catch<br>Compact, light-weight<br>Spare parts readily available | Specimens go through fan<br>Collects non-targets<br>Need $CO_2$ source (dry ice)<br>Specimens may not have fed (limits value for pathogen testing) |

| | | |
|---|---|---|
| **$CO_2$ GENERATING PROPANE TRAP** (AKA Mosquito Magnet, others)<br>Uses counterflow geometry (CFG) collection principle, $CO_2$ produced catalytically by 20 lb propane tank (some models need 110AC current), maximum dimensions 28"X20"X27.5," collection bag in internal housing, units movable on wheels. | Best use: species composition, pathogen testing, population density<br>Diverse mosquito trap catch, esp. with Octenol lure<br>Specimens don't go through fan<br>Large number of certain species can be caught<br>Can run long time without tending<br>Few non-targets (mainly spiders)<br>No need for dry ice | Relatively pricey, bulky<br>Requires compressed gas<br>Some require AC outlet<br>Some alternate manufacturer's trap versions perform poorly<br>Specimens can dry-out if not removed promptly<br>Specimens may not have fed (limits value for pathogen testing) |

* The first two traps listed, Gravid Trap and CDC Trap w/$CO_2$, are time-tested and proven to have the most value in WNV mosquito and viral surveillance, to date. Other traps exist (e.g., CFG Trap, Wilton Trap) but are either not commercially available or little is known about their performance. Specific products or brands mentioned do not imply endorsement by the US Government. Prepared by B. Pagac, USACHPPM-North, Apr 1 2003 (ben.pagac@na.amedd.army.mil)

# APPENDIX I
# DISTRICT OF COLUMBIA
# DEPARTMENT OF HEALTH
# CONTACTS


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# APPENDIX J
# INFORMATION REGARDING THE USE OF MOSQUITO REPELLANTS

## Centers for Disease Control and Prevention, April 22, 2005

Repellents are an important tool to assist people in protecting themselves from mosquito-borne diseases.

A wide variety of insect repellent products are available. CDC recommends the use of products containing active ingredients which have been registered with the U.S. Environmental Protection Agency (EPA) for use as repellents applied to skin and clothing. EPA registration of repellent active ingredients indicates the materials have been reviewed and approved for efficacy and human safety when applied according to the instructions on the label.

Of the active ingredients registered with the EPA, two have demonstrated a higher degree of efficacy in the peer-reviewed, scientific literature *. Products containing these active ingredients typically provide longer-lasting protection than others:

- DEET (N,N-diethyl-m-toluamide)
- Picaridin (KBR 3023)

Oil of lemon eucalyptus [p-menthane 3,8-diol (PMD)], a plant based repellent, is also registered with EPA. In two recent scientific publications, when oil of lemon eucalyptus was tested against mosquitoes found in the US it provided protection similar to repellents with low concentrations of DEET.

Oil of lemon eucalyptus has not been tested against mosquitoes that spread malaria and some other diseases which occur internationally. See CDC Travelers' Health website (http://www.cdc.gov/travel/) for specific recommendations concerning protection from insects when traveling outside the United States.

In addition, certain products which contain permethrin are recommended for use on clothing, shoes, bed nets, and camping gear, and are registered with EPA for this use. Permethrin is highly effective as an insecticide and as a repellent. Permethrin-treated clothing repels and kills ticks, mosquitoes, and other arthropods and retains this effect after repeated laundering. The permethrin insecticide should be reapplied following the label instructions. Some commercial products are available pretreated with permethrin.

Length of protection from mosquito bites varies with the amount of active ingredient, ambient temperature, amount of physical activity/perspiration, any water exposure, abrasive removal, and other factors. For long duration protection use a long lasting (micro-encapsulated) formula and re-apply as necessary, according to label instructions.

**EPA recommends the following precautions when using insect repellents:**

- Apply repellents only to exposed skin and/or clothing (as directed on the product label.)
- Do not use repellents under clothing.
- Never use repellents over cuts, wounds or irritated skin.
- Do not apply to eyes or mouth, and apply sparingly around ears.
- When using sprays, do not spray directly on face—spray on hands first and then apply to face.
- Do not allow children to handle the product. When using on children, apply to your own hands first and then put it on the child. You may not want to apply to children's hands.
- Use just enough repellent to cover exposed skin and/or clothing. Heavy application and saturation are generally unnecessary for effectiveness. If biting insects do not respond to a thin film of repellent, then apply a bit more.
- After returning indoors, wash treated skin with soap and water or bathe. This is particularly important when repellents are used repeatedly in a day or on consecutive days. Also, wash treated clothing before wearing it again. (This precaution may vary with different repellents—check the product label.)
- If you or your child gets a rash or other bad reaction from an insect repellent, stop using the repellent, wash the repellent off with mild soap and water, and call a local poison control center for further guidance. If you go to a doctor because of the repellent, take the repellent with you to show the doctor.

Note that the label for products containing oil of lemon eucalyptus specifies that they should not to be used on children under the age of three years. Other than those listed above, EPA does not recommend any additional precautions for using registered repellents on pregnant or lactating women, or on children. For additional information regarding the use of repellent on children, please see CDC's Frequently Asked Questions about Repellent Use: http://www.cdc.gov/ncidod/dvbid/westnile/qa/insect_repellent.htm.

DEET-based repellents applied according to label instructions may be used along with a separate sunscreen. No data are available at this time regarding the use of other active repellent ingredients in combination with a sunscreen. See http://www.epa.gov/pesticides/health/mosquitoes/insectrp.htm for additional information on using EPA-registered repellents.

***Sources:**

Fradin MS, Day JF. 2002. Comparative Efficacy of Insect Repellents Against Mosquito Bites. *New England Journal of Medicine*. 347 (1):13-8.

Barnard DR, Xue RD. 2005. Laboratory Evaluation of Mosquito Repellents Against Aedes albopictus, Culex nigripalpus, and Ochlerotatus triseriatus (Diptera: Culicidae). *Journal of Medicinal Entomology*. Jul; 41 (4):726-30.

**For more information, visit www.cdc.gov/westnile, or call CDC at 1-800-CDC-INFO (English and Spanish) or 1-888-232-6348 (TTY).**

# APPENDIX K
# RESEACHERS SEACH FOR ALTERNATIVES TO DEET

(*Beyond Pesticides*, May 28, 2008) Researchers have begun preliminary work to find suitable and safe alternatives to the widely used mosquito repellent DEET. Several possibilities have been identified, which repel mosquitoes for longer periods of time, but their safety for use on humans still needs to be investigated.Researchers, with funding from the Department of Defense, set out to determine what makes insect repellents work, and then to use that information in finding more effective ways to chase away disease-carrying insects. Insect repellents are used to repel biting insects such as mosquitoes and ticks that spread diseases such as encephalitis, Lyme disease, Rocky Mountain spotted fever, malaria and dengue fever.

Ulrich R. Bernier, PhD, co-author of this study published online in the Proceedings of the National Academy of Sciences http://www.pnas.org/ and research chemist at the Agriculture Department's mosquito and fly research unit in Gainesville, Fla., remarked that several of the new chemicals reviewed were "just phenomenal."

Using previous USDA data on hundreds of chemicals collected over 50 years, the researchers rated chemicals from "1″ to "5″ on ability to repel insects, and then focused on what the most effective ones — the 5s — had in common. They were able to narrow the study down to 34 molecules, 23 that had never been tested before and 11 that had been tested, with a focus on a class of chemicals known as N-acylpiperidines.

Tests conducted using cloth treated with the chemicals were very promising. Some of the chemicals repelled mosquitoes for as long as 73 days and many worked for 40 to 50 days, compared to an average of 17.5 days with DEET. The 10 most effective were narrowed down to seven, with eliminations based on concerns about toxicity and high cost to produce. Safety testing to make sure these chemicals are safe to be applied on human skin is expected to begin this summer.

DEET (N,N-diethyl-meta-toluamide) is commonly used as an insect repellent but its use has become highly controversial. Scientists have raised concerns about the use of DEET and seizures among children, even though the U.S. Environmental Protection Agency (EPA) claims that there is not enough information to implicate DEET with these incidents. DEET is quickly absorbed through the skin and has caused adverse effects including severe skin reactions including large blisters and burning sensations. Laboratory studies have found that DEET can cause neurological damage, including brain damage in children

Its synergistic effect with other insecticides is also a major health concern. DEET, when used in combination with permethrin - a synthetic pyrethroid insecticide, likely facilitates enhanced dermal absorption of permethrin and induces symptoms such as headache, loss of memory, fatigue, muscle and joint pain, and ataxia, which causes an inability to coordinate muscular movements. Several studies done by a team of Duke University researchers lead by Mohammed Abou-Donia suggest that DEET in conjunction with permethrin-impregnated clothing may be linked to Gulf War Syndrome. DEET was originally developed for military use in 1946 and was then registered for use on the general public in 1957. According to the EPA, more than one third of the U.S. population uses DEET-containing products every year.

Safer alternatives to DEET include picaridin, citronella and other essential oils, like oil of lemon eucalyptus.

## APPENDIX L

## HOW TO REPEL MOSQUITOES SAFELY

With summer here, and the bugs out in full force, along with some very itchy arms and legs, thoughts turn to mosquitoes- and how to avoid them. The first step in avoiding mosquitoes is prevention. Remove any standing water where mosquitos can breed around the home and the schoolyard, such as plant pots, leaky hoses, empty buckets, toys, and old tires.
The best way to avoid mosquitoes, especially in the evening when they are most active, is to wear long pants and long sleeves. Burning citronella candles outside also helps repel mosquitoes. Since these two options are not always possible, mosquito sprays can sometimes be a good alternative. Many common mosquito sprays can contain toxic ingredients, however, so it is important to consider all of the option and read labels carefully before buying or spraying the repellents.

**Some Least-Toxic Mosquito Sprays Include:**

- **Oil of Lemon Eucalyptus**- CDC recommends lemon eucalyptus oil repellents as a good alternative to DEET. The scented oil of lemon eucalyptus masks both carbon dioxide and lactic acid exhalations that alert mosquitoes to our presence, essentially hiding humans from detection. According to CDC, this plant-based mosquito repellent provides protection time similar to low concentration DEET products.(Repel Lemon Eucalyptus Insect Repellent- www.repel.com).

- **Essential oils**- Pesticides made with essential oils are derived from plants that are known to have insecticidal properties. Some essential oils used in repellents include Cedarwood, Soybean Oil (www.biteblocker.com), and **Geraniol** (MosquitoGuard- www.wildroots.com, Bite Stop- www.bitestop.com, Bugband- www.bugband.net) When compared against products like Citronella, Geraniol proved to be 100% more effective. Against products containing 10% Deet, Geraniol proved to be more effective.

- **Picaridin** (KBR 3023), dervived from pepper, is a newly registered repellent that CDC claims provides comparable protection as DEET products with similar concentrations (Cutter Advanced- www.cutterinsectrepellent.com/). The limited data available on this product suggest that it has low potential for toxicity.

- **Citronella sprays**- The same ingredient in the candles that repels mosquitoes also is in some mosquito sprays, including the repellent Natrapel (www.tendercorp.com).

- Some repellents include many of these ingredients, including: Quantum Buzz Away Mosquito Repellent (www.quantumhealth.com), All Terrain (http://www.allterrainco.com/), Avon Skin-So-Soft, and Herbal Armour.

These recommendations are based on what is known about the relative toxicity of the active ingredient. The inert ingredients, which often makes up the largest portion of the product, is not disclosed, and therefore cannot be evaluated. With all these repellents, be sure to reapply often (following the directions on the label) to repel the mosquitoes most effectively.

**Be Sure to Avoid:**

- **Pesticide-impregnated clothing**, such as Buzz Off clothing, which is impregnated with the synthetic pyrethroid permethrin. Permethrin is a possible carcinogen and a suspected endocrine disruptor. Endocrine disruptors interfere with normal hormone function and can contribute to breast and testicular cancer, birth defects, learning disorders, and other problems. Animal studies also indicate that small amounts of permethrin may cause immunotoxicity, or corruption of the immune system.

- **Products containing DEET**, which is quickly absorbed through the skin and has caused effects including severe skin reactions including large blisters and burning sensations. Laboratory studies have found that DEET can cause neurological damage, including brain damage in children. EPA requires that child safety claims be removed from all end-use product labels, as they are misleading. DEET labels must inform users of precautions that are realistically impossible to follow, including not applying the product near children's hands or face, not apply over cuts, wounds and irritated skin, and thoroughly wash all treated skin with soap and water after returning indoors.

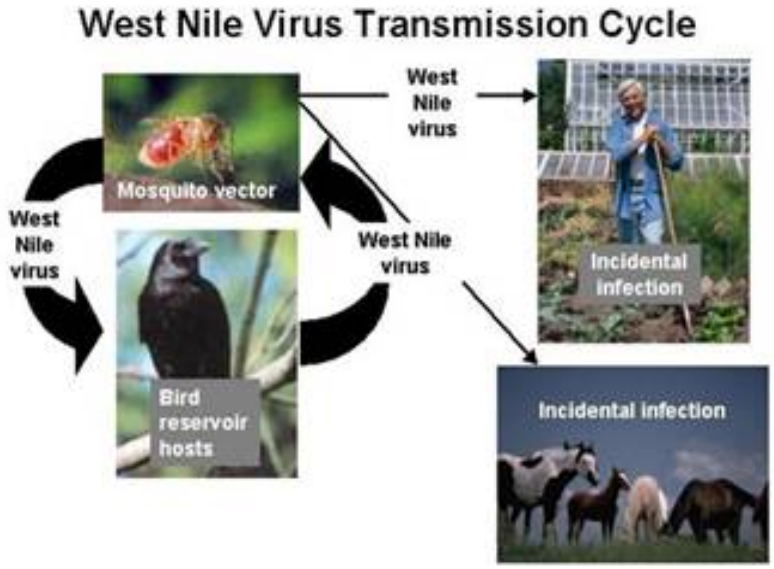
# APPENDIX M

## GOVERNMENT OF THE DISTRICT OF COLUMBIA
## WEST NILE VIRUS ARBOVIRUS REPORT
**YEAR END 2008**

West Nile virus is a mosquito-borne virus naturally found in bird populations that appeared in the eastern United States in 1999. Since then, every year the virus emerges throughout the country. The occurrence of the virus in the eastern region, including the Washington DC area, has been less apparent than in the mid and western states during the last few years.

The infection can be transmitted to other animals and humans through the bite of an infected mosquito and in rare cases transmission may occur from human to human by: Tran placental transmission from mother to unborn child, breastfeeding, blood transfusion from an infected donor, and organ transplantation from an infected donor.

The principal transmission cycle of West Nile virus involves several species of birds and the virus has been isolated from 43 species of mosquitoes nationwide. The virus is transmitted when a mosquito feeds on an infected bird and later feeds on another animal. Some varieties of bird may carry a high enough concentration of virus in the blood to pass on to mosquitoes which feed on their blood and are known as reservoirs. However, some animals, including humans, carry much lower levels of virus if infected. At these levels, it is thought that virus cannot in turn be passed on to biting mosquitoes. These groups are known as incidental hosts.



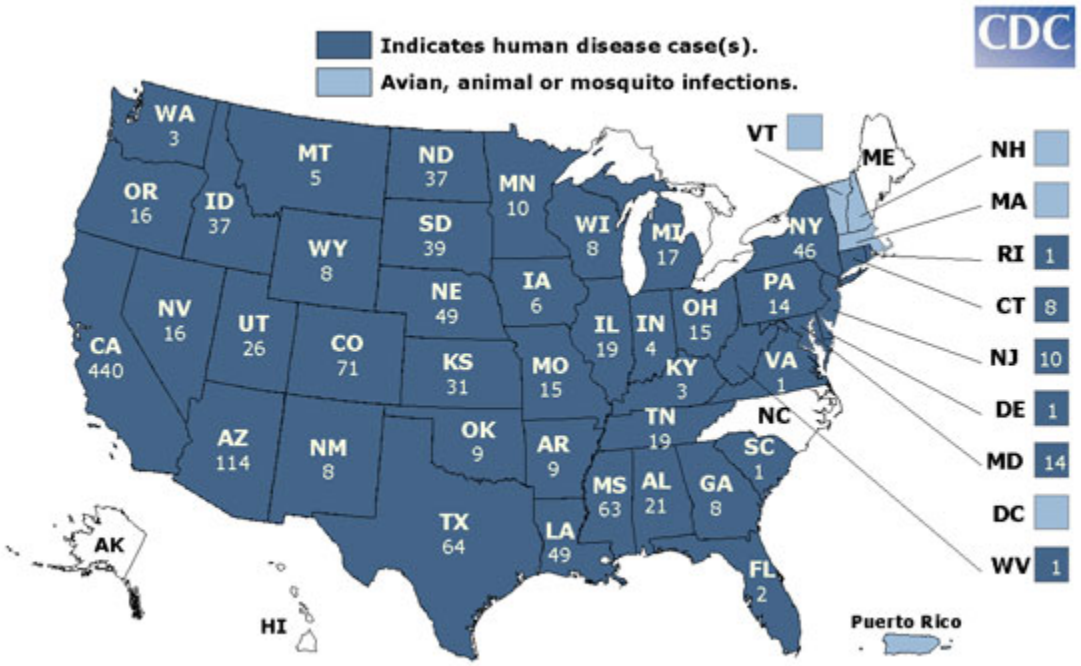

The most serious manifestation of WNV infection is fatal encephalitis (inflammation of the brain) in humans and horses, as well as mortality in certain domestic and wild birds. WNV has also been a significant cause of human illness in the United States since 2002.

Approximately one percent of people infected with West Nile virus may go on to develop severe neuroinvasive disease such as West Nile meningitis, West Nile encephalitis or West Nile poliomyelitis. The clinical symptoms include: high fever, weakness, stiff neck, severe headache, and change in mental status, flaccid paralysis, gastrointestinal symptoms and seizures.

Every year the DC Department of Health (DOH) conducts human, avian, mammal and mosquito surveillance as part of the West Nile Virus surveillance system and keeps an extensive database and spreadsheet record detailing this surveillance. DOH continued the operation of the West Nile virus center in 2008 and offered the web site information at http://doh.dc.gov. DOH has trained staff to assist residents with identifying and eliminating potential mosquito breeding sites and to speak at neighborhood meetings and health fairs. The fundamental components of the West Nile virus plan were prevention and personal protection.

This report includes both, an overview of the West Nile Virus cases in 2008 throughout the country compiled every year by the Centers for Disease Control and a Year-End report of the West Nile Virus program developed during the 2008 season for the Washington DC area and compiled by the DC Department of Health.

**2008 West Nile Virus Activity in the United States**
**Provisional Data**
**(Reported to CDC as of February 13, 2009**



This nation-wide map comprises the West Nile incidence as reported by state and local health departments through the ArboNET (electronic surveillance system established by CDC). This map shows nation wide distribution of WNV infections. Washington DC had 8 human cases where none were fatal.

The incidence of West Nile virus infections in the District of Columbia for human and mosquito is shown in the next table titled West Nile Virus Activity.

**Data table:**

As of February 13, 2009, a total of 1,338 human cases were reported nation wide, 674 (50%) were reported as West Nile meningitis or encephalitis (neuroinvasive disease), 624 (47%) were reported as West Nile fever (milder disease), and 40 (3%) were clinically unspecified at this time. CDC adds that the high proportion of neuroinvasive disease cases among reported cases of West Nile virus disease reflects surveillance reporting bias. Serious cases are more likely to be reported than mild cases. Also, the surveillance system is not designed to detect asymptomatic infections. Data from population-based surveys indicate that among all people who become infected with West Nile virus (including people with asymptomatic infections) less than 1% will develop severe neuroinvasive disease.

The national cumulative dead bird infection as of April 9, 2009 was 3,026 more widely distributed in California, central states and sporadically throughout the northeast states. The national cumulative mosquito infection amounted to 8,770 cases. While the incidence of WNV in sentinel animals was 748, the number of domestic animals reported was 224, both sporadically distributed mainly throughout the western states.

A total of 178 presumptively viremic blood donors (PVDs) have been reported to CDC's ArboNET surveillance program through state and local health departments for 2008.
A PVD is a person whose blood tested positive when screened for the presence of West Nile virus. PVDs are followed up by the blood agency to verify their infection with additional tests. Some PVDs do go on to develop symptoms.

A recently reported situation emerged in 2008 due to an increase in false-positive test results that were obtained with a specific brand detection kit. The Centers for Disease Control and Prevention (CDC), the Food and Drug Administration (FDA), and state health departments investigated one of the laboratories that received specimens from healthcare providers and hospitals throughout the country. The “false positive” result suggested that a person had the WNV infection but a more specific confirmatory test was recommended.

# West Nile Virus in the District of Columbia

The Department of Health (DOH) has had a West Nile Virus (WNV) program in operation since WNV was first reported in the United States in 1999. The three foundations of this program are surveillance, mosquito control and outreach and education.

Same as in previous years, the West Nile viral activity in the District was low in positive human and mosquito cases in comparison with other states. This year there were 8 (eight) confirmed human cases with WNV out of 11 (eleven) human cases tested. Among the 8 human cases, 2 were females and 6 were males, all above 50 years of age. Of the 8 (eight) cases, 4 (four) were reported as West Nile meningitis or encephalitis (neuroinvasive disease), 1 (one) was reported as West Nile fever (milder disease), and 3 were clinically unspecified. The onset of illness for 3 cases was in August and 5 during September 2008.

As in the previous years, the Department of Defense 8 army installations located in the District of Columbia collaborated with the Department of Health by conducting their own WNV surveillance during the season. They trapped, collected and tested a total of 3,734 female mosquitoes resulting in 588 mosquito pools tested for WNV. Of these tests 37 mosquito pools contained 440 mosquitoes with WNV. Adding the results from both agencies, a total of 12,025 (twelve thousand and twenty five) female mosquitoes were tested in the District of Columbia with a total incidence of 62 (sixty two) positive WNV mosquito pools.

The total MIR value (minimum infection rate = 62 divided by 12,025 and multiplied by 1,000) for the District was 5/1000, relatively low when compared with other neighboring jurisdictions.

The following chart summarizes the surveillance results of the viral activity in human, mosquito and avian populations since 2002 in the District of Columbia up to 2008.

# West Nile Virus Activity
# Washington D.C.
# 2002 - 2008

**HUMAN SURVEILLANCE**

| | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 |
|---|---|---|---|---|---|---|---|
| **Tested** | 80 | 43 | 17 | 8 | 11 | 0 | 11 |
| **Positive** | 31 | 3 | 2 | 4 | 2 | 0 | 8 |
| **Probable** | 3 | 6 | 0 | 1 | 0 | 0 | 1 |
| **Negative** | 28 | 25 | 15 | 3 | 4 | 0 | 3 |
| **Incomplete** | 18 | 9 | 0 | 0 | 1 | 0 | 0 |

**MOSQUITO SURVEILLANCE**

| | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 |
|---|---|---|---|---|---|---|---|
| **Pools Tested** | 1,315 | 2,114 | 1,671 | 1,399 | 1,917 | 1,014 | 1,292 |
| **Pools Positive** | 84 | 49 | 42 | 55 | 56 | 12 | 62 |
| **#Females tested** | 10,755 | 20,684 | 28,929 | 27,087 | 31,726 | 10,112 | 12,025 |

**AVIAN SURVEILLANCE**

| | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007, 2008 |
|---|---|---|---|---|---|---|---|
| **Collected** | 914 | 905 | NA | NA | NA | NA | NA |
| **Tested** | 444 | 206 | NA | NA | NA | NA | NA |
| **Positive** | 360 | 175 | NA | NA | NA | NA | NA |
| **Negative** | 84 | 31 | NA | NA | NA | NA | NA |
| **Rate of Positivity** | 81.08% | 84.95% | NA | NA | NA | NA | NA |

Neighboring jurisdictions, such as Alexandria, Virginia reported 71 (seventy one) positive mosquito pools [> 7,000 pools tested (>242,000 female mosquitoes) as of early Sept 08]. No avian, no equine, and one human case reported. There was one sentinel flock seroconversion in the tidewater area.

Fairfax County in Virginia reported 126,384 mosquitoes tested in 4,336 pools in 2008. As a result, a total of three hundred and seventy (370) positive pools were found in six species; Aedes albopictus (19), Aedes vexans (1), Anopheles punctipennis (1), Culex spp. (54) (this includes pips, res and sali's); Cx. erraticus (1), Cx. pip/res (10), Cx. pipiens (192), Cx. restuans (92). The infection rate (MLE) is comparable to the past few years, maxing out at about 20/1,000. Their first human case was collected in August 19, 2008. State of Maryland reported 13 human cases, 20 WNV mosquito pools resulted positive out of 2,633 pools tested containing 26,999 female mosquitoes. No avian but one equine case was reported with WNV. Virginia and now Maryland health officials have detected Eastern Equine Encephalitis (EEE) positive mosquito pools. Although the EEE cycle is

primarily restricted to areas in and near vegetated fresh-water swamps with a lot of fallen trees, this is a concern due to the proximity to the District of Columbia. The EEE human bridge vector is Coquillettidia perturbans.

# Active Surveillance in Mosquito Populations

The West Nile Virus program was activated in early May of 2008 with proactive larviciding at catch basin in communities where in previous years viral activity had occurred and/or expected problem sites. Then in mid June the mosquito collections for West Nile Virus surveillance started at all wards. A list of all the locations is illustrated in the next page that shows a total of 32 trap sites, plus 8 Department of Defense installations located in the District described as Fort McNair, Armed Forces Retirement Home, Anacostia Annex, Marine Barracks, Naval Research Laboratory, Naval Observatory, Washington Naval Yard and Walter Reed Army Medical Center.

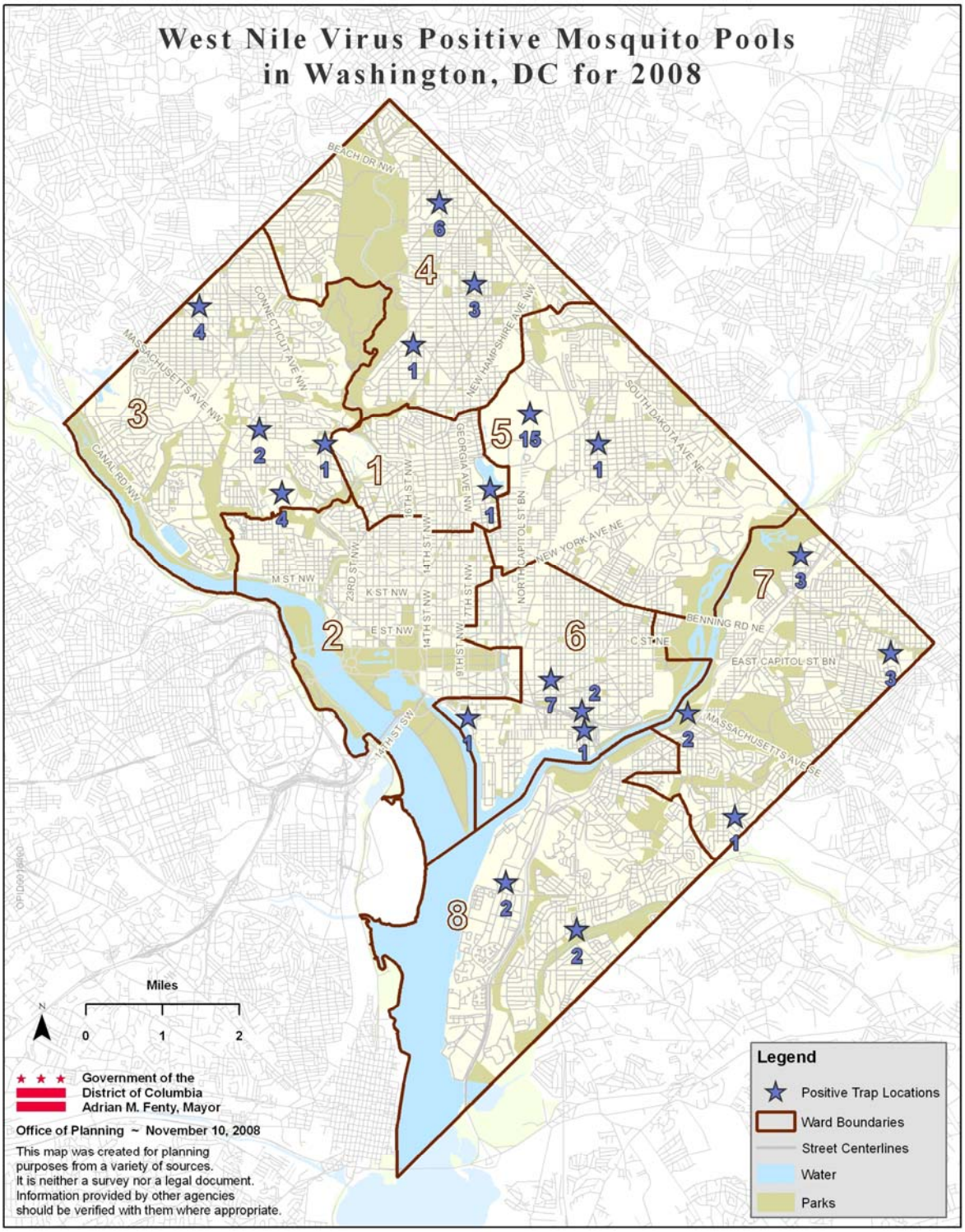
Mosquito surveillance staff trapped and collected mosquitoes in the District in a grid-like pattern throughout the District. The trap sites are distributed in all 8 wards for monitoring and the total number of traps set for mosquito collections varied from 3 to 5 for all the wards.

Each week, the staff identified the adult mosquitoes by species and determined the total number of female mosquitoes contained in a number of pools collected at each site for that week. Then the specimens were submitted for West Nile virus testing to the DOH Public Health Laboratory. The District Department of Health also collected specimens from the National Zoological Park. The Army conducted mosquito collections at their installations located in the District of Columbia within their installations located in the District and tested at their army base in Maryland. Their findings and results were reported to the DC Department of Health for inclusion in the data transmitted to the Centers for Disease Control.

This year again, the District of Columbia showed that Culex sp. is the most predominant mosquito and vector of WNV widely found throughout. This was the first year, however, that the total number collected and tested of Asian Tiger (Aedes albopictus) reached a high of 1, 175 (one thousand one hundred and seventy five) out of 7,112 (seven thousand one hundred and twelve) Culex sp. However, no Asian Tiger tested was found positive for WNV.

The Asian Tiger mosquito (Aedes albopictus) tested positive for WNV in record numbers in Virginia. A total of 28 positive pools of albopictus were found mostly from northern Virginia. The Virginia health officials used different trapping methods resulting in a larger number getting trapped and tested.

The following map illustrates the locations of the trap sites at each ward, including the locations of the DoD army installations. This map also illustrates the number of mosquito pools infected with West Nile Virus encountered at the trap sites as the season progressed. Number of pools found is represented by the number next to the blue stars.


West Nile Virus Positive Mosquito Pools
in Washington, DC for 2008
Miles
0
1
2
Government of the
District of Columbia
Adrian M. Fenty, Mayor
Office of Planning ~ November 10, 2008
This map was created for planning
purposes from a variety of sources.
It is neither a survey nor a legal document.
Information provided by other agencies
should be verified with them where appropriate.
Legend
Positive Trap Locations
Ward Boundaries
Street Centerlines
Water
Parks

Mosquito surveillance in the District showed that all wards had some incidence of WNV during the length of the trapping season, although mosquito numbers were relatively low. For instance, Wards 1, 3, 4, 6 had only 2 sites (out of 4 sites) showing WNV:

Ward 1 had 2 single positive pools in 2 sites.
Ward 3 had 4 positive pools in 1 site and 2 in another site.
Ward 4 had 3 positive pools in 1 site and 1 in another site.
Ward 5 had 1 positive pool in only one site.
Ward 6 had 2 positive pools in 1 site and 1 in another site.
Ward 7 had 3 positive pools each in 2 sites and 1 in another site.
Ward 8 had 2 positive pools in 1 single site.

The total count of mosquito pools per ward may be seen in the next chart titled "2008 West Nile Virus Mosquito Surveillance" and on the GIS DC map that follows.

The Summary of Mosquito Collections 2008 shows the entire mosquito count collected during the mosquito trapping period. It is worth to mention that the numbers of mosquitoes contained in pools were highest during the month of August while the peak of mosquito collections extended from mid July (in Wards 3 and 7) to the end of August (in Wards 1, 3 and 7). Mid July resulted in 3 positive mosquito pools with WNV and August resulted in 7 mosquito pools with WNV.

The number of mosquito collections varied throughout the wards as the warm season settled. The mosquito activity in Ward 7 was relatively high from June through July. Ward 4 gradually worked to a high from mid June to mid July. Ward 3 maintained a high from mid June to mid July and later by the end of August the mosquitoes peaked again. The area affected was mainly at the northernmost location in the District.

Mosquitoes collected in the District by the Department of Defense army installations showed greater activity than in previous years as well. Positive mosquito pools were seen from July through mid September. Locations where the positive pools were relatively high in number came from the Armed Forces Retirement Home, Fort McNair and Water Reed Army Medical Center. Due to the high mosquito numbers, the Department of Health provided mosquito control treatments at any standing water sites within their campus and surrounding catch basins along with outreach information on personal protection.

# 2008 West Nile Virus Mosquito Surveillance

| Ward | 2008 Site Number | Street Address | Positive Pools |
|---|---|---|---|
| Ward 1 | 1C | 1800 block Newton Street NW | |
| | 1E | 3100 block Connecticut Ave NW (North) | 1 |
| | 1F | 3100 block Connecticut Ave NW (South) | |
| | 1G | 300 block McMillan Drive NW | 1 |
| Ward 2 | 2F | 3600 block S Street NW | |
| | 2G | 2100 block O St NW | |
| | 2H | 1300 block Massachusetts Ave NW | |
| Ward 3 | 3E | 4400 block Harrison Ave NW | 4 |
| | 3G | 3800 block Wisconsin Ave NW | 2 |
| | 3H | 70 unit block Observatory Circle NW | |
| | 3I | 4400 block Greenwich Parkway NW | |
| Ward 4 | 4D | 1700 block Shepherd St NW | |
| | 4E | 500 block Oglethorpe St NW | 3 |
| | 4F | 700 block Tuckerman St NW | |
| | 4H | 1500 block Emerson St NW | 1 |
| | 4I | 4500 block Blagden Ave NW | |
| Ward 5 | 5C | 1200 block New York Ave NE | |
| | 5F | 1200 block Kearney St NE | 1 |
| | 5G | 3000 block Douglas St NE | |
| | 5H | 4200 block 13th St NE | |
| | 5I | 4200 Harewood Rd NW | |
| Ward 6 | 6A | 638 Massachusetts Ave NE | |
| | 6E | 600 block I St SW | 1 |
| | 6F | 1900 block M St SE | 2 |
| Ward 7 | 7A | 2400 block 34th St SE | 1 |
| | 7C | 4300 block Polk St NE | 3 |
| | 7D | 5700 block Blaine St NE | 3 |
| | 7E | 5700 block Nannie Helen Burroughs Ave NE | |
| | 7G | 2900 block Pennsylvania Ave SE | |
| Ward 8 | 8A | 10 unit block Atlantic St SE | |
| | 8B | 500 block Lebaum St SE | |
| | 8D | 700 block Mississippi Ave SE | 2 |
| | 8H | 2400 block 25th St SE | |
| DoD Installations | DOD1 | Fort McNair | 7 |
| | DOD2 | Armed Forces Retirement Home | 15 |
| | DOD3 | Anacostia Annex | 2 |
| | DOD4 | Marine Barracks | 2 |
| | DOD5 | Naval Research Laboratory | |
| | DOD6 | Naval Observatory | 4 |
| | DOD7 | Washington Naval Yard | 1 |
| | DOD8 | Walter Reed Army Medical Center | 6 |
| Total Positive Pools | | | 62 |

## DOH SUMMARY OF MOSQUITO COLLECTIONS - 2008

| Collection Dates | Species | | | Results (Mosquitoes) | | Results (Pools) | | Total Collected and Tested | |
|---|---|---|---|---|---|---|---|---|---|
| | Culex | Aedes. Alb. | Other sp. | Negative | Positive | Negative | Positive | Mosquitoes | Pools |
| 6/11 - 6/12 | 254 | 57 | 2 Culiseta | 313 | 0 | 24 | 0 | 313 | 24 |
| 6/18 - 6/19 | 381 | 71 | 1 Anopheles | 453 | 0 | 36 | 0 | 453 | 36 |
| 6/24 - 6/26 | 467 | 191 | 0 | 658 | 0 | 48 | 0 | 658 | 48 |
| 7/2 - 7/3 | 491 | 148 | 0 | 639 | 0 | 56 | 0 | 639 | 56 |
| 7/8 - 7/9 | 514 | 192 | 0 | 706 | 0 | 60 | 0 | 706 | 60 |
| 7/16 - 7/17 | 906 | 136 | 0 | 977 | 65 | 59 | 3 | 1042 | 62 |
| 7/23 - 7/24 | 201 | 28 | 0 | 220 | 9 | 29 | 1 | 229 | 30 |
| 7/30 - 7/31 | 347 | 51 | 1 Culiseta | 398 | 1 | 37 | 1 | 399 | 38 |
| 8/6 - 8/7 | 328 | 34 | 0 | 353 | 9 | 32 | 1 | 362 | 33 |
| 8/13 - 8/14 | 220 | 37 | 0 | 215 | 42 | 31 | 2 | 257 | 33 |
| 8/19 - 8/21 | 461 | 72 | 0 | 453 | 80 | 48 | 4 | 533 | 52 |
| 8/26 - 8/27 | 946 | 35 | 0 | 812 | 169 | 53 | 7 | 981 | 60 |
| 8/26 - 9/4 | 449 | 33 | 0 | 470 | 12 | 43 | 1 | 482 | 44 |
| 9/10 - 9/11 | 484 | 21 | 0 | 445 | 60 | 42 | 3 | 505 | 45 |
| 9/17 - 9/19 | 167 | 26 | 0 | 175 | 18 | 31 | 2 | 193 | 33 |
| 9/25 | 301 | 27 | 0 | 328 | 0 | 28 | 0 | 328 | 28 |
| 10/1 - 10/2 | 195 | 16 | 0 | 211 | 0 | 24 | 0 | 211 | 24 |
| Grand Totals | 7112 | 1175 | 3 | 7826 | 465 | 681 | 25 | 8291 | 706 |

Note:

The data collected from the 8 Department of Defense army installations located in the District (excluded from above chart) is:

Total number of pools tested: 588
Total female mosquitoes tested: 3,734
Total positive pools: 37
Total number of mosquitoes in positive pools: 440
Total trap nights: 416

# Mosquito Control

The most effective way to control mosquitoes over time is to locate and eliminate breeding sites.

DOH staff did not apply aerial pesticides due to a number of factors, including: (1) the residents of the District have the highest asthma rate in the nation, aerosolized pesticides can trigger asthma and aggravate respiratory ailments; (2) reported negligible results after spraying; (3) multi-jurisdiction controlled land in the District, such as, Federal Government, National Park Service and US Army; (4) reduced spraying regimen in neighboring jurisdictions; and (5) the destruction of non target and endangered species.

Thus, in 2008 a total of 17,553 (seventeen thousand five hundred and fifty three)catch basins were treated and controlled for mosquito larvae by the DC Department of Health (DOH) vector control staff and the continued cooperation from the Washington's Water and Sewer Authority in partnership during 2008. Also this year DOH responded to requests from the residents due to elevated mosquito counts and treated standing water sites besides catch basins. As in the past, the organic compound called Vectolex was used at all sites to control mosquito larvae.

Upon every incidence of positive results of human and mosquito cases during the surveillance system, the West Nile virus staff applied larvicide to sewer drains and catch basins in an eight block area surrounding the location and distributed outreach and education materials stressing personal protection and reduction of breeding sites in the same eight block area.

The Bureau of Epidemiology and the Bureau of Community Hygiene distributed information packets to physicians, infectious disease practitioners at the local hospitals, and veterinarians detailing surveillance efforts in the District and the protocols for reporting possible West Nile virus cases. Regional and citywide West Nile Virus task forces were reinforced with continued partnerships, meetings and sharing of regional information. The task forces were comprised of District of Columbia Department of Health and other District agencies, various military and federal agencies, various neighboring health agencies, utility companies, and others. A West Nile virus call center was established to educate callers, record citizen complaints, route concerns to various staff and enter data.

# West Nile Virus Call Center

The Department of Health continued to offer the West Nile virus Call Center number at (202) 535-2323 in 2008.

The West Nile virus call center received calls regarding West Nile virus, standing water complaints and dead bird sightings. An operator was available to answer questions during regular business hours, and was checked frequently during off times, including the weekend. An extensive West Nile virus web site with detailed information regarding the District's WNV program may be found at www.dchealth.dc.gov. In addition, DOH disseminated Health Alerts to the public and the medical community, as soon as the positive mosquito pools were tested. The staff recorded resident concerns and questions and reports on dead birds, standing water, human health, pesticide spraying and others. The staff forwarded the questions and concerns to the appropriate staff for individual response and attention.

The following health alert flyer exemplified the alert sent to the residents in the form of a News Release by the Department of Health. The release was disseminated to the general public upon the first three positive mosquito pools found in the District of Columbia.

# Active Surveillance in Human Population

DOH conducted active human surveillance from June through October. Staff blast faxed a Physician's Alert at the beginning of the year to alert physicians to the testing and specimen submission criteria. Staff contacted Infectious Disease Practitioners at all area hospitals on a weekly basis to obtain suspect case reports based on the monitoring of specialty departments, including Infectious Disease, Neurology, and Intensive Care. Staff also made calls to hospital and commercial laboratories to identify cerebrospinal fluid specimens meeting criteria consistent with a viral etiology (e.g. increased protein, pleocytosis, and negative bacterial gram stain and culture), and positive serologies for West Nile or SLE virus. Laboratory staff obtained acute and convalescent serum from all patients with suspected cases for serological testing. Cerebrospinal fluid was obtained from encephalitis cases for serological testing and by RT-PCR. The DC Public Health Laboratory conducted laboratory tests. In total, eleven (11) samples were collected and eight (8) confirmed positive for West Nile Virus in 2008.

# Passive Surveillance in Avian Populations

The public was encouraged to report dead birds. DOH discontinued collections and testing of dead birds in 2002 when it was determined that WNV was endemic in the District. In the event of dead bird clusters the staffs conducted a complete investigation and test the birds for WNV. In 2008 the District if Columbia received a total of 134 dead birds reported by the residents. After reporting the dead birds, the residents were instructed in the proper disposal methods that include handling with gloves and double bagging in plastic for removal.

Effective August 9, 2002, DOH ceased dead bird collection because the positive rate was exceptionally high and West Nile virus in birds was considered endemic in the District. At that time the total count of birds collected was 905 birds, 340 were processed for testing, 31 tested negative, 175 birds tested positive and 134 were disposed. The result was a positive rate of 84.95%.

Since 2003 up to present, residents were encouraged to report the dead birds to the center and dispose of the birds themselves or call the Department of Public Works for animal removal services.

# Passive Surveillance in Mammal Populations

Animal Disease Prevention staff forwarded West Nile Virus information to all District veterinarians. The information packets outlined the surveillance criteria and emphasized reporting suspect cases of neurological illness in horses, pets, and other animals with outdoor exposures, and collection of appropriate laboratory specimens. No mammals were reported as suspect cases for testing for 2008.